Tursiops Researcher Workshop
October 20 and 22, 2021 | Held via webinar

Discussion Summary

I. Background, Meeting Purpose and Structure

At the February 2020 meeting of the Atlantic Scientific Review Group (ASRG), the following recommendation was made:

"The ASRG recommends that the SEFSC and SERO convene a meeting with external research partners to examine revisions and updates to the stock structure of common bottlenose dolphins off the coast of North Carolina. Draft SARs indicate a 50% reduction in the abundance of coastal bottlenose dolphins along the eastern seaboard between 2011 and 2016, presumably as a result of the 2013-2015 UME. In addition, the two strategic estuarine stocks in North Carolina continue to experience bycatch in coastal gillnet fisheries. This bycatch is managed by the Bottlenose Dolphin Take Reduction Plan. At the same time, there has been a significant increase in our knowledge of these stocks due to research conducted inside (new molecular approaches to assigning stock identity) and outside (e.g., new photo-ID research projects in the Chesapeake Bay, New Jersey, New York, Delaware, and Assateague) the agency. Several outstanding questions still exist regarding stock definition, as highlighted in the SEFSC update and relevant SARs. It is still difficult, and often impossible, to assign fisheries takes to specific stocks. We understand that NMFS is exploring how existing approaches can be integrated in ways that will improve our understanding of the definition of these stocks. We suggest that a review of Atlantic coastal migratory and estuarine bottlenose dolphin stocks be conducted in 2021, with a specific focus on definition of the four stocks which occur in North Carolina and on developing the ability to assign stock identity to specific dolphins, both for abundance assessments and for by- caught animals."

NOAA's National Marine Fisheries Service (NMFS) responded in agreement that the stock structure and assignment of bycatch for common bottlenose dolphins in North Carolina is complicated and agreed with the ASRG's recommendation to convene a meeting with external research partners to discuss the topic. As a result, NMFS convened a two-day facilitated, virtual workshop on October 20 and 22, 2021, to discuss ongoing *Tursiops sp.* research efforts along the U.S. Atlantic coast. The goal of the workshop was to improve information exchange and data sharing between NMFS and the broader academic and research community to inform management of coastal migratory and estuarine bottlenose dolphin stocks along the U.S. Atlantic coast. The objectives of the meeting focused on the following:

- Share the latest knowledge on bottlenose dolphin research efforts along the U.S. Atlantic coast to better understand distribution, movements, and stock structure.

- Consider how this information informs our understanding of bottlenose dolphin stock structure, especially as it relates to estimating abundance and assigning "takes" to specific stocks.
- Identify and prioritize research needs based on key knowledge gaps in bottlenose dolphin movements and stock structure.
- Present and discuss NMFS' interest in developing a study to utilize the resources of the Mid-Atlantic Bottlenose Dolphin Catalog (MABDC) to evaluate stock structure.
- Identify mechanisms to improve collaboration among the broader research community.

Day One (October 20) focused on a series of background briefings on the Marine Mammal Protection Act (MMPA) mandates and stock structure guidance, followed by the sharing of information by NMFS researchers, the MABDC Curator and contributors, as well as stranding network members. Day One ended with a presentation by NMFS on near-term management needs to support the MMPA and Bottlenose Dolphin Take Reduction Plan mandates. Day Two (October 22) provided an opportunity for group discussions to prioritize: identification of near-term critical research questions that would help meet MMPAmandates; strategies for addressing key data gaps, and developing ways to improve collaboration among different research organizations. The workshop agenda is included as Attachment 1.

II. Participation

The workshop included NMFS Southeast Fisheries Science Center (SEFSC) staff, academic and independent researchers, stranding network staff and NMFS Southeast Regional Office (SERO) staff. A total of 45 researchers and colleagues participated in the meeting. Consensus Building Institute (CBI) Senior Mediator Bennett Brooks facilitated the meeting. A list of participants is included as Attachment 2.

III. Workshop Preparation and Approach

An eight-member Steering Committee met over several months to prepare for the workshop and gather relevant background information to be shared with all workshop participants. Steering Committee members were: Kim Urian (MABDC); Andrew Read (Duke University); Randall Wells (Chicago Zoological Society/ Sarasota Dolphin Research Program); Mridula Srinivasan, Jenny Litz, Lance Garrison, and Patricia Rosel (SEFSC); Stacey Horstman (SERO); and Bennett Brooks (CBI).

The Steering Committee agreed that the focus of the workshop should be on the bottlenose dolphin stocks distributed across the geographic area identified in the ASRG's recommendation, which range from the central eastern coast of Florida north through New York State. Stocks of interest identified in this geographic scope include: Southern Migratory (SM), Northern Migratory (NM), Northern North Carolina Estuarine System (NNCES), and Southern North Carolina Estuarine System (SNCES). Discussions of these stocks included the coastal and estuarine waters north of Charleston, South Carolina, and focused only on coastal stocks south of Charleston, South Carolina.

In preparation for the workshop, the Steering Committee developed a questionnaire (see Attachment 3a) that was circulated to the invited workshop participants requesting information on their: primary research objectives and focus; research timeframe and status; geographic scope of their research effort; research methods used; photo-id catalog status and size; and photo-ID coverage. Researchers were asked if they have additional photo-ID effort that has not yet been submitted to the MABDC and if so, from when and where. They were also asked if they assigned individual dolphins to a particular stock as defined by NMFS and if so, what criteria were used. Participants were then asked to highlight three things that NMFS should know about their research and what were their most important outstanding research questions regarding distribution, abundance and stock structure of bottlenose dolphins in their study area. Finally, researchers were asked for suggestions to improve the efficiency of collaboration among research programs. The responses to the questionnaire were used to develop the workshop agenda and to prioritize topics and themes for the group discussions.

IV. Workshop Summary

DAY ONE, October 20, 2021

A. Welcome, introductions, and meeting objectives

ASRG Member Andy Read opened the meeting, welcomed participants, reviewed the ASRG's recommendation as the impetus for this workshop (see above), and underscored the need to work together to address the complex challenges associated with understanding bottlenose dolphin distribution, movements, and stock structure. Meeting facilitator Bennett Brooks then presented the meeting purpose and objectives, the agenda, protocols for participation, and ground rules for discussions.

B. Presentations

Day One and the beginning of Day Two included presentations by members of the Steering Committee and workshop participants followed by a question and answer session.

Below is a brief summary of each presentation's focus.

Presentation 1: Mridula Srinivasan, SEFSC

Mridula Srinivasan, Director, Marine Mammal and Turtle Division, provided a brief presentation on the recent realignment at the SEFSC, noting that she and Jenny Litz will be heading up the Center's newly formed Marine Mammal and Turtle Division leadership. In her remarks, Srinivasan emphasized the Center's interest and commitment to bi-directional information-sharing, supporting both existing and fostering new collaborations between the Division and non-NOAA researchers to better understand bottlenose dolphin distributions, movements, and stock structure.

Presentation 2: Lance Garrison, SEFSC

Lance Garrison provided a high-level overview of the MMPA mandates and the Agency's work on bottlenose dolphins. His presentation focused on: MMPA mandates and stock structure guidance; history of how *Tursiops sp.* stock structure had been defined and has evolved; and relevance of bottlenose dolphin stock structure research and analysis to effective Agency management. Garrison spoke to the need and importance of multiple lines of scientific evidence in order to accurately delineate the various demographically independent populations of bottlenose dolphins in order to perform mandates set forth by the MMPA including determining mortality and abundance estimates, stock assessments, etc. Lastly, Garrison noted that the Agency's understanding of stock distribution has not been updated since 2012; hence, the Agency sees this as a critical information need.

Presentation 3: Nicole Vollmer and Patricia Rosel, SEFSC

Nicole Vollmer and Patricia Rosel provided an update on their work to better understand bottlenose dolphin stock structure in North Carolina using next-generation RAD-seq genetics data. Their ***preliminary*** results suggest four distinct populations of *Tursiops sp.* in estuarine and coastal waters of North Carolina: one population that ranges from New Jersey to South Carolina; a second population located mostly in the northern waters of Pamlico Sound; a third population found in south/central North Carolina estuarine waters generally from Cape Fear to Cape Lookout; and a fourth population located throughout central North Carolina estuarine waters generally from Cape Fear to southern Albemarle Sound. Ongoing research efforts will look at gene flow among the four groups, as well as explore the extent to which possible environmental correlates (e.g., depth, salinity, etc.) may influence population structure. Additionally, Vollmer and Rosel are continuing to look for genetic markers in their dataset with the aim of improving assignment of individuals to stock.

Presentation 4-5: Kim Urian, MABDC Curator

Kim Urian provided two presentations to the group:

(1) **Background on the development of the MABDC and its current status.** The MABDC was initiated over 24 years ago in 1997, and includes ~21,000 dolphin identifications from 46 photo-id contributors, with images dating back to 1979. Urian summarized the protocols for the submission of images and data to the MABDC and for access to data and images for publication, management or education. Ongoing collaborations with MABDC contributors, students and stranding programs were also presented. Urian then provided a summary of the responses from the pre-workshop questionnaire submitted by workshop participants (see Attachment 4: MABDC Questionnaire Summary). Similar to the objectives of the SEFSC, the majority of respondents stated that their primary research objective was to understand distribution and movement patterns of bottlenose dolphins, followed by estimating abundance, and working to understand population structure. The most commonly used research method was photo-ID and baseline population monitoring. Sixty percent (9 out of 15) of participants used the computer matching software program finFindR to identify matches, but nearly all contributors match manually to some extent. Only half of the

respondents indicated that they assign a matched individual dolphin to a stock (the most common criteria used were the definitions from the NMFS SARs, whether an individual was coastal or offshore, and utilizing bioindicators such as *Xenobalanus*).

(2) **An overview of the preliminary status of analyses being conducted for a multi-authored manuscript entitled, "A collaborative approach using photo-identification techniques to define biologically meaningful population units of bottlenose dolphins along the U.S. East coast".** Urian presented various options for using existing catalog data to identify meaningful biological units, as well as highlighted strategies for addressing possible sources of bias in these data. The analyses are ongoing and the analytical approaches and methods will continue to be refined as the dataset evolves. A draft manuscript will be circulated to contributing authors for review prior to being submitted for publication. authors.

Presentation 6: MABDC Contributors

A standard slide template was prepared by the Steering Committee and circulated to the invited representatives from 17 research and/or stranding network organizations to provide a brief overview of their work to share with the group. The presentation summarized information they provided on the questionnaire that was distributed to all workshop participants. Below is a table identifying the lead presenter and their affiliation and a map highlighting each respective study area (Figure 1). See Attachment 3: Participant Presentations for each slide presentation.

Presenting Researcher / Stranding Network Organizations		
Kristi Ashley Collom, Gotham Whale	Amy Engelhaupt, HDR Inc. / Amy Engelhaupt Consulting	Robin Perrtree / Tara Cox, Savannah State University
Jackie Toth, Stockton University	Jessica Taylor, Outer Banks Center for Dolphin Research	Steve Burton, Florida Atlantic University Harbor Branch Oceanographic Institute
Melissa Laurino, Cape May Whale Watch and Research Center	Andy Read, Duke University	Alex Costidis, Virginia Aquarium
Gregory Silber, Independent Researcher/Kutztown University Instructor	Annie Gorgone, Southeast Fisheries Science Center, MMTD	Vicky Thayer, North Carolina Division of Marine Fisheries, NC State University College of Veterinary Medicine
Janet Mann, Potomac-Chesapeake Dolphin Project	Rob Young, Coastal Carolina University	William McLellan, UNC Wilmington
Helen Bailey, University of Maryland Center for Environmental Studies	Todd Speakman, National Marine Mammal Foundation	

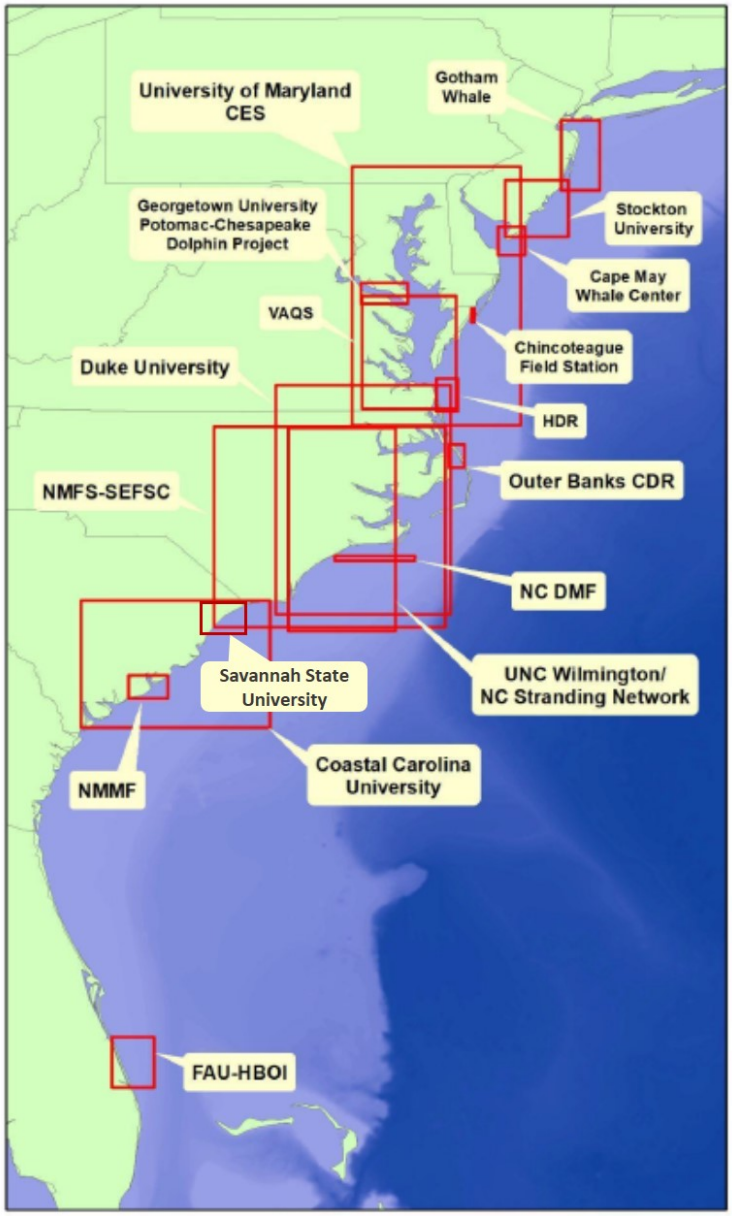


Figure 1. Study areas along the U.S. Atlantic East Coast for the 17 participating research or stranding network groups.

DAY TWO, October 22, 2021

Presentation: Lance Garrison, SEFSC

Lance Garrison gave a presentation outlining the Agency's need to better understand bottlenose dolphin stock delineation (DIP; demographically independent population) in both space and time. His presentation first laid out the challenges in estimating abundance and trends when there is uncertainty in DIP distribution and boundaries. He then highlighted key areas of greatest uncertainty. Finally, he presented a possible process for addressing these questions

based on feedback from this workshop, comprehensive matching across catalogs, supervised classification based on space-time history, and integration of genetics, ongoing discussions between NMFS and MABDC collaborators/data contributors, and – eventually – a review by the ASRG (among others) and adoption into the stock assessment process.

During the discussion following Garrison's presentation, workshop participants expressed interest in the potential benefits of merging the genetic data with the photo-ID data in the MABDC to help address these critical uncertainties. In addition to posing several clarifying questions to better understand the data and potential implications, participants made the following recommendations:

- Map genetic sequencing back to sighting histories of known animals
- Expand genetic sampling to include Virginia, Maryland, and Delaware given the potential for significant overlap of different putative stocks in those waters
    - Consider prioritizing genetic sampling on the smallest, most vulnerable populations given that the newest data suggests a more complicated picture than the Agency's current understanding of stock structure.
- Recommend reconsidering how populations are being defined and managed (e.g., could we have the structure all wrong?)

C. Discussion: Research Priorities

The remainder of Day Two focused on discussions to identify potential research priorities highlighted by workshop participants. S. Horstman (SERO) presented a summary of key research themes drawn from participants' pre-workshop questionnaire responses and the discussions on Day One. The common research themes fell into four primary topics of interest with the following associated questions:

- Discussion Theme #1: Virginia/Maryland estuarine stock(s)
    - What stock(s) of dolphins use the Chesapeake Bay and Potomac River, and what is their seasonal distribution?
- Discussion Theme #2: North Carolina estuarine stocks
    - What estuarine stocks inhabit inshore waters of NC and what is their seasonal distribution; and what is the extent of overlap between the estuarine stocks and adjacent migratory stocks?
- Discussion Theme #3: Northern Migratory Stock
    - What is the spatial and temporal extent of the northern boundary of the Northern Migratory stock?
- Discussion Theme #4: Southern Migratory stock
    - Does the Southern Migratory stock exist; and if so, what is the spatial-temporal extent?

Based on the background presentations, workshop participants were split into three breakout groups to discuss and identify near-term research actions that would be most useful in addressing MMPA mandates. The goal of the breakout groups was to develop recommendations for near-term research needs that were commonly identified across all three breakout groups, as well as to foster greater participation among all workshop attendees. Specifically, the breakout groups were asked to identify the top three research priorities drawn from the four discussion themes (see above) and identify any associated challenges and considerations related to each priority.

Summaries from each breakout group are included in Attachment 5. While the conversations in each breakout had a slightly different focus or emphasis and potential research priorities varied, there were several common themes that emerged in the full group discussion that followed. The resulting recommendations to address key data needs are summarized below:

- Leverage existing data to address critical stock structure uncertainties and help define meaningful, manageable DIPs. A first step is for current collaborators to determine and compile available biopsy samples for analysis and describe potential ranging patterns of those sampled individuals. Participants recommended comparing individual animals that have a biopsy sample with catalogs in the MABDC to better understand their geospatial range. This would be an important next step to help determine how to proceed with an integrative approach incorporating genetics and photo-ID.
- The importance of genetics data in defining DIPs should be given the highest priority because it fundamentally provides information on breeding behaviors in different dolphin groups.
- The need to revisit current understanding related to migratory stocks (e.g., what is the northern boundary of the Northern Migratory stock? Is the Southern Migratory stock truly distinct from Northern Migratory?).
- Understanding the ecological factors that may drive stock delinitiation. Incorporating Bottlenose Dolphin Take Reduction Team priorities (addressing concentrated take issues) as a focal point for research (e.g., longstanding NC estuarine bycatch issues and gillnet takes in VA estuarine waters).
- On a longer-term basis, incorporate the ecological factors that drive stock delineation for effective management strategies

Discussion: Improving Collaboration among Research Programs

The final discussion topic centered on recommendations and ideas to improve the effectiveness of collaboration among research programs. Participants met in six, smaller randomly-assigned breakout groups to generate ideas. Again, common themes emerged from the discussions held in the breakout groups on how best to improve collaboration. The steps most commonly cited were to: improve the frequency and accessibility of data sharing across Agency and academic/independent researchers; integrate FinFindR into the MABDC website to expedite the matching process; schedule more opportunities for information-sharing and periodic gatherings

similar to this workshop; and provide support for the maintenance and expansion of the MABDC to facilitate other data types. Below is a categorized summary of the specific ideas put forward by the different groups. These recommendations closely mirrored suggestions in the pre-workshop questionnaire responses.

<table>
<tr><th colspan="2">Recommendations for improving collaboration</th></tr>
<tr><td>Data Integration
Integrate finFindR (or equivalent) into the MABDC online matching application to expedite the matching process.
Expand the MABDC to include other types of data to make it a ‘one-stop shop’ (e.g., genetics, acoustics, telemetry, etc.)
Merge genetic data with photo-ID data in the MABDC
Keep this group mutually informed on future matching photo-ID technologies
Give careful thought on how to share other (non-photo-ID) data such as age, sex, biopsied animals, etc.</td><td>Meetings and Information-Sharing
Maintain open communication and a sense of community that has begun with this meeting, (e.g. SEAMAMMS, annual meeting among these collaborators, etc.)
Reconvene this group annually for continued collaboration and data sharing perhaps at forums already available, like SEAMAMMS
NMFS to share the annual summary reports from those who have General Authorizations to conduct photo-ID work.</td></tr>
<tr><td>Funding
Increased funding
Jointly collaborate on funding
Support MABDC to be maintained and curated on a regular basis</td><td>Other
Put status information of MABDC contributors on the front page of MABDC</td></tr>
</table>

V. Workshop Summary

Based on the workshop discussions, participants outlined the following next steps:

- The workshop Steering Committee will develop an integrated list of research priorities that draws on the common themes that emerged from the discussions and breakout groups. These research priorities will be shared with workshop participants for review and confirmation. (This synthesis of research priorities is still pending).

Attachments

- Attachment 1: Final Agenda
- Attachment 2: Participant List
- Attachment 3: Participant Presentations
- Attachment 3a: Participant Questionnaire
- Attachment 4: MABDC Questionnaire Summary
- Attachment 5: Breakout Group Summary Tables

Attachment 1: Tursiops Researcher Workshop Final Agenda

Wednesday, October 20, 8:45am – 12pm ET (https://cbuilding.zoom.us/j/92941439280)
Friday, October 22, 12:30pm – 4pm ET (https://cbuilding.zoom.us/j/98441418787)

Purpose:
Improve information exchange and data sharing between NMFS and the broader academic and research community to improve management of coastal migratory and estuarine bottlenose dolphins along the U.S. Atlantic coast.

Objectives:
- Share latest knowledge derived from bottlenose dolphin research efforts along the U.S. Atlantic coast to better understand distribution, movements, and stock structure
- Consider how this information informs our understanding of bottlenose dolphin stock structure, especially as it relates to estimating abundance and assigning takes to specific stocks
- Identify and prioritize research needs based on key gaps in knowledge of bottlenose dolphin movements and stock structure
- Present and discuss NMFS' interest in developing a proposed study to draw on the Mid-Atlantic Bottlenose Dolphin Catalog (MABDC) to inform draft revisions to stock structure
- Identify mechanisms to improve collaboration among the research community

Wednesday, October 20 (8:45AM -12PM ET)

- Arrival and Tech Check (15 min)

- Welcome and Workshop Overview (15 min)
    - Agenda, ground rules, introductions

- Presentations: Understanding MMPA mandates and NMFS' work in this area (30 min)
    - MMPA mandates, stock structure guidance, history of Tursiops stock structure along the Atlantic coast, and relevance to management (Lance Garrison, NMFS)
    - Update on genetic analysis of population structure in North Carolina (Patricia Rosel and Nicole Vollmer, NMFS)
    - Opportunity for Q&A

- Presentations: Research summaries (110 min, includes 10 min break)
    - Review of MABDC (Kim Urian, MABDC Curator)
    - Update on analysis of bottlenose dolphin movements and ranging patterns from New York through South Carolina using the MABDC (Kim Urian, MABDC Curator)
    - Summary presentations by individual research groups (All, 5 min per group)
        - The flow of presentations will be in the order of research organizations conducting work from the NY/NJ area and continue south through Florida
    - Opportunity for Q&A

- Presentation: Near-term management needs in support of the MMPA and Bottlenose Dolphin Take Reduction Plan mandates (30 min)
    - NMFS' discusses its interest in developing a management proposal to conduct stock structure analysis and modeling (Lance Garrison, NMFS)
    - General discussion

Friday, October 22 (12:30-4PM ET)

- General Discussion (includes 20-minute break)
    - What critical research questions will help meet MMPA mandates?
    - How do we address key data needs?
    - What can be done to improve the efficiency of collaboration among research programs?

- Discuss Next Steps

Geographic Scope for the Workshop:

- Bottlenose dolphin stocks of primary interest: Southern Migratory, Northern Migratory, Northern North Carolina Estuarine System, Southern North Carolina Estuarine System
- Geographic Range: the central eastern coast of Florida north through New York State (consistent with Bottlenose Dolphin Team recommendations)
    - North of Charleston – estuarine and coastal
    - South of Charleston – coastal only

Attachment 2:
Tursiops Researcher Workshop Participant List

Last Name	First Name	Affiliation
Urian	Kim	MABDC curator
Read	Andy	Duke University
Randy	Wells	Chicago Zoological Society
Silva	Dani	Coastal Carolina University
Young	Rob	Coastal Carolina University
McLellan	William	UNCW
Pabst	Ann	UNCW
Mann	Janet	Georgetown University/Potomac Chesapeake Dolphin Project
Jacoby	Anni Marie	Duke/Potomac Chesapeake Dolphin Project
Rittmaster	Keith	NC Maritime Museum
Thayer	Vicky	NC Division of Marine Fisheries
Taylor	Jess	Outer Banks Center for Dolphin Research
Barco	Susan	Virginia Aquarium
Swingle	Mark	Virginia Aquarium
Englehaupt	Amy	VA-HDR
Speakman	Todd	National Marine Mammal Foundation
Schultz	Tom	Duke University
Cox	Tara	Savannah State University
Burton	Steve	Harbor Branch Oceanographic Institute
Bailey	Helen	University of Maryland
Balmer	Brian	*Previously National Marine Mammal Foundation*
Silber	Greg	Chesapeake Bay Field Station
Collom	Kristi	Gotham Whale
Toth	Jackie	Stockton University
Laurino	Melissa	Cape May Whale Watch & Research Center
Gorgone	Annie	NMFS SEC
Costidis	Alex	Virginia Aquarium & Marine Science Center
Perrtree	Robin	Savannah State University
Schwacke	Lori	*Previously National Marine Mammal Foundation*
Fujioka	Ei	Duke University -MABDC OBIS SEAMAP
Garrison	Lance	NMFS SEC
Rosel	Patty	NMFS SEC
Litz	Jenny	NMFS SEC
Mullin	Keith	NMFS SEC
Vollmer	Nikki	NMFS SEC
Horstman	Stacey	NMFS SERO
Powell	Jessica	NMFS SERO
Engleby	Laura	NMFS SERO
Shervanick	Kara	NMFS SERO
Lyssikatos	Marjorie	NMFS NEFSC
Brooks	Bennett	CBI, faciliator
Coogan	Colleen	NMFS GARFO
Srinivsan	Mridula	NMFS SEC
Morse	Laura	Orsted / Ocean Wind projects + marine mammal

Attachment 3:
Participant Presentations

1. Kristi Ashley Collom
2. Jacalyn Toth Sullivan
3. Melissa Laurino
4. Gregory Silber
5. Janet Mann
6. Helen Bailey
7. Amy Engelhaupt
8. Jessica Taylor
9. Andy Read
10. Annie Gorgone
11. Rob Young
12. Todd Speakman
13. Robin Perrtree
14. Steve Burton
15. Alex Costidis
16. Vicky Thayer
17. William McLellan

Tursiops Research Workshop – Research Summary

Tursiops truncatus, **New York Bight Apex (NYBA)**

Kristi Ashley Collom, **Gotham Whale**
Masters thesis **I** Diana Reiss Lab **I** City University of New York 2017-2021

Primary research objectives 2011-2019

Baseline data collection for NYBA
Citizen science / outreach / education
Present findings to Inform policy and management

kristiashleycollom@gmail.com

Methods

GIS Spatial analysis of seasonal distribution
Photo ID – Presence of ectoparasites
Skin anomalies (TBD)

What three things should NMFS know about your work:

GOTHAM WHALE

I: This is **baseline** opportunistic data representing the **seasonal presence** of coastal *T.truncatus* in **the largest marine port across the Eastern Coast of the United States**.

II. **P**reliminary **average group size (46)** and **range (1-150)** for this coastal region indicates that there are **larger groups** observed here then in similar habitats across the Mid-Atlantic.

Distance to Shore 7.84km - 68.69% <10 m

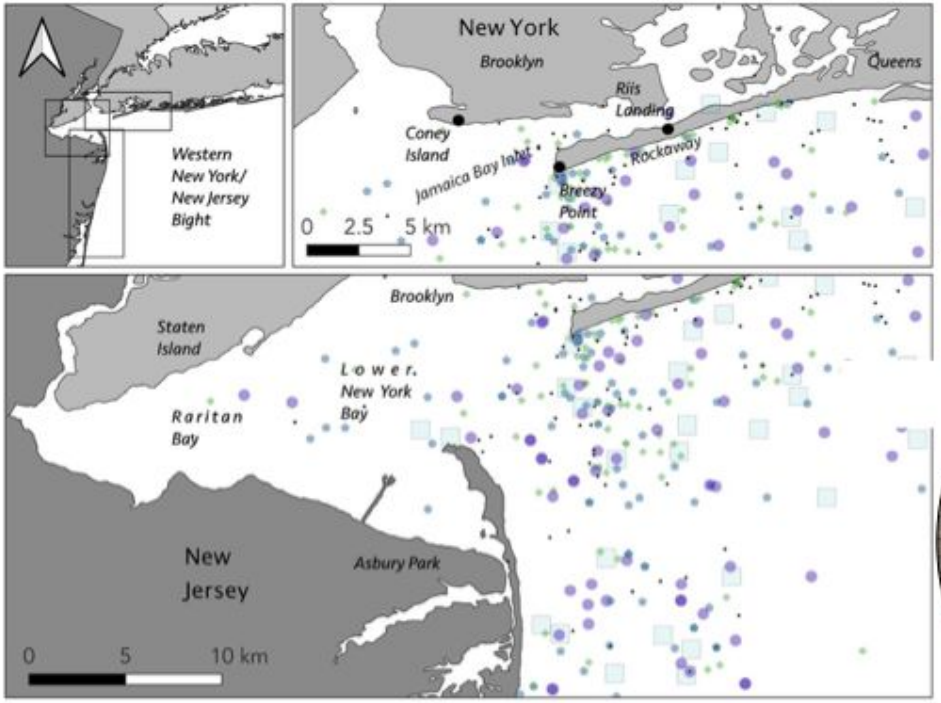
III. Evidence for **site fidelity** and **migratory movements** along the coast.

Source	State	Season	T	*n*	Survey Area	ID	AGS	HI	LO	DTS (km)	ADTS (km)	ISO (m)
Present Study	NY NJ	March-Dec 2011-2018	B C O	412	~677 km^2	253	46	150	1	0-51	7.76	0.5-80
Toth *et al.* (2011)	NJ	May-Oct 2005	C E	29	~420 km^2	194	C1 1-11 C2 1-41	41	1	0-6	.428 ±.028	0.5-17
Toth *et al.* (2012)	NJ	May-Oct 2003-2005	C E	73	3323 km 730 km	205	11.4 3.6	1	16	0.4-1.8		0.6-10.5
Torres *et al.* (2005)	CP, NC, GA	Jan-Nov 2000-2001	E C O	494		5431		150	1	1-65		0-501
Barco *et al.* (1999)	VA	April-Nov 1994		264			2.45 / km	>30		1-5	1	
Urian *et al.* (2014)	NC, SNCES	July 2006	E C	158		306	16.7 15.7	120	1	0-1		
Roberts *et al.* (2016)	Eastern Coast	1992-2014	C O	10, 274			1-40/ 100 km^2					1-100
Zolman *et al.* (2002)	SC	Oct-Jan 1994-1996	E	898	21 km^2	112						0-25
Gubbins (2002)	SC	Oct 1994-Dec 1998	E	2511	100 km^2	478				1-10		0-7

City Slickers

Seasonal Distribution of Bottlenose Dolphins (Tursiops truncatus) in the Western New York Bight

Kristi A. Collom [1], Paul Sieswerda [2], Eric A. Ramos [1,3], Celia Ackerman [2], Catherine Granton [2], Merryl Kafka [2], & Diana Reiss [1,3]
1 Hunter College, City University of New York, NY, 2 Gotham Whale, Staten Island, NY, 3 The Graduate Center, City University of New York, NY



Seasonal Surveys April-December

2011-2019

605 Whale Watching Trips

412

QGIS 3.8

Group Size

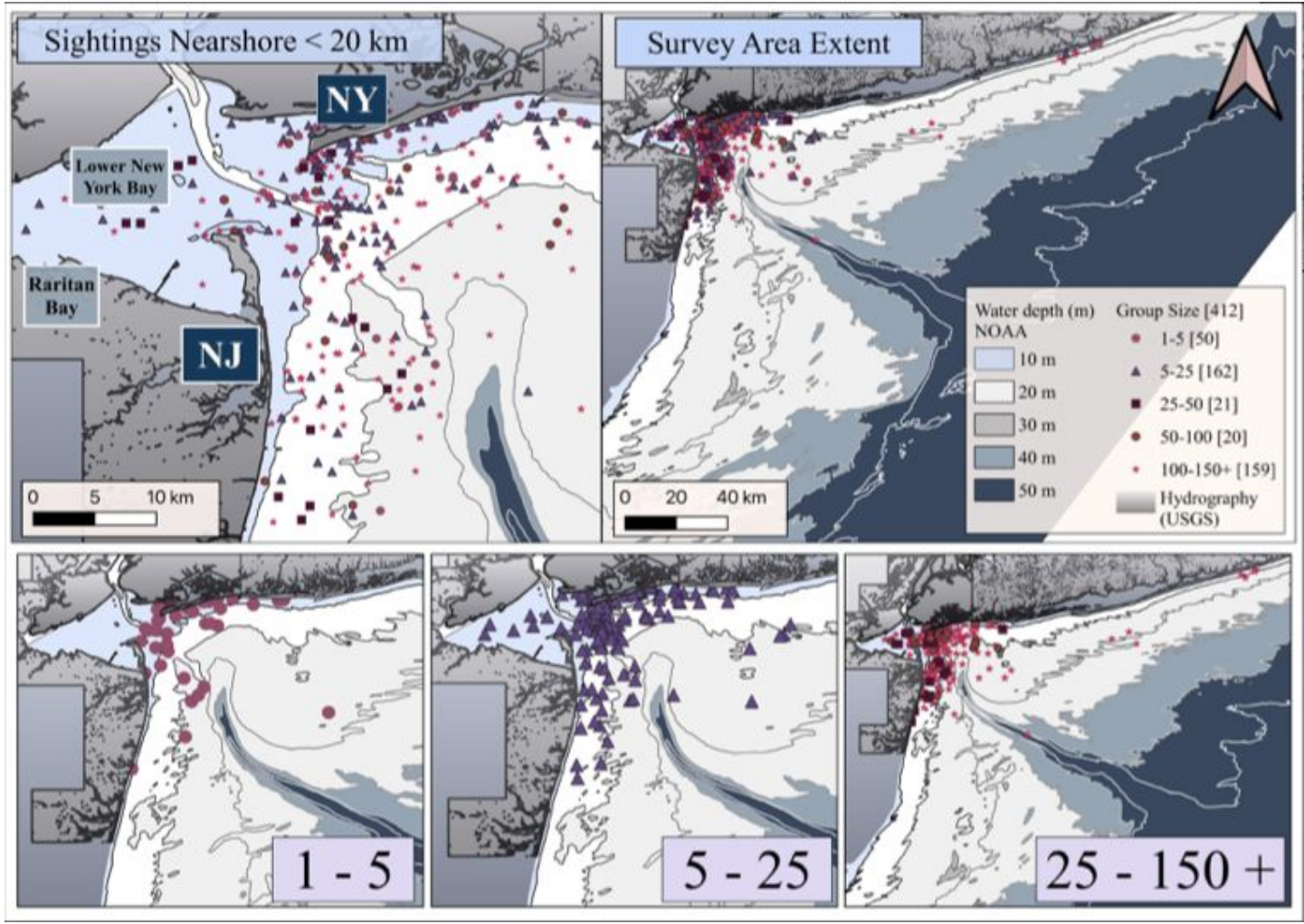
Distance to Shore

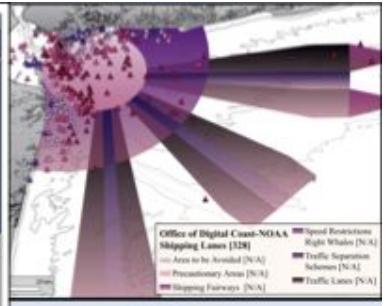
1679

2012

Rosel et al. 2011
Urian et al. 2014

GOTHAM WHALE


Sightings Nearshore < 20 km
NY
Lower New York Bay
Raritan Bay
NJ
0 5 10 km
Survey Area Extent
0 20 40 km
Water depth (m) NOAA
10 m
20 m
30 m
40 m
50 m
Group Size [412]
1-5 [50]
5-25 [162]
25-50 [21]
50-100 [20]
100-150+ [159]
Hydrography (USGS)
1 - 5
5 - 25
25 - 150 +



1679

2012

What are the most important outstanding questions regarding distribution, abundance and stock structure?

Distribution What are the drivers influencing distribution? How will development and climate flux impact inshore distribution? Extended seasonal occurrence? Habitat preference in this region? Where aren't we looking?

Abundance What are the possible influences for robust group size and variance in fin morphology?
How can we better inform policy and management?

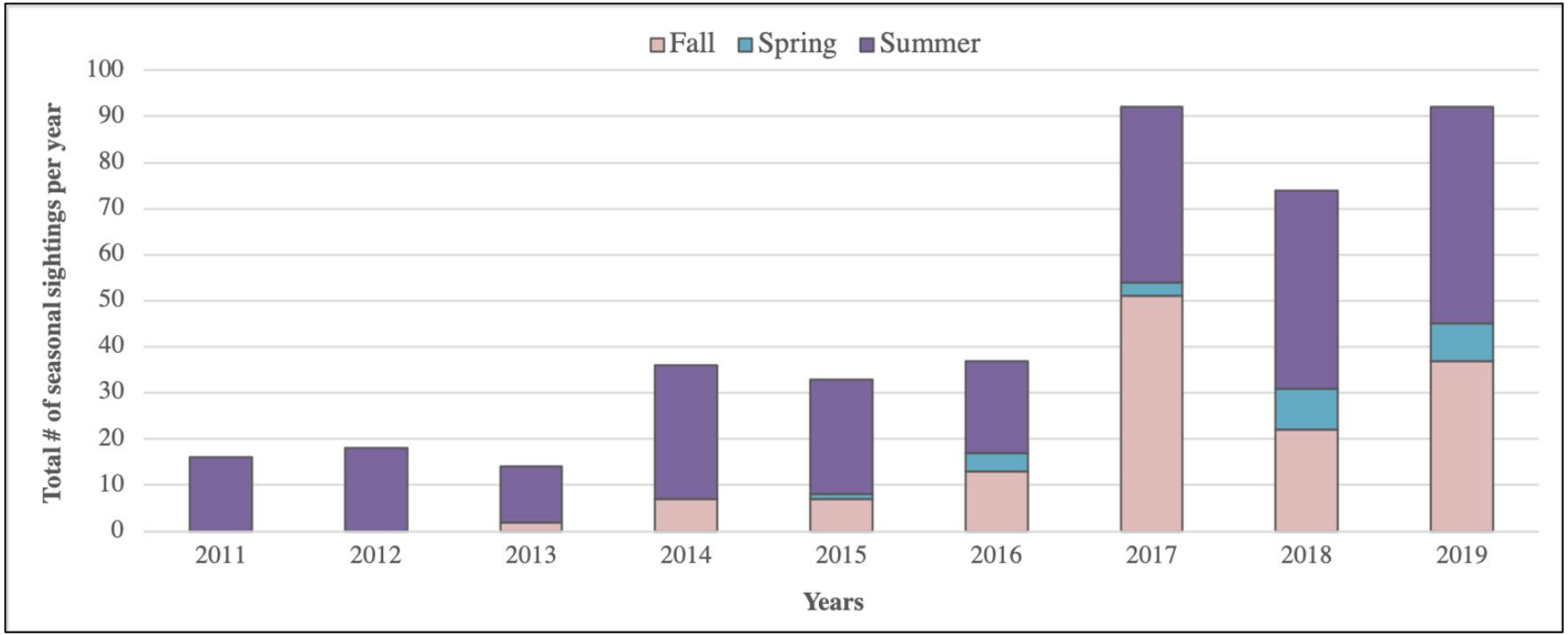
Stock Structure Is this a regional stock delineation? Residents? Transients? Using fin morphology and presence of ectoparasites as indicators?

What could be done to improve the efficiency of collaboration among research groups?

I: Consortium for Ecosystem Sentinels – shared objectives, resources and strategies to better address future conservation efforts + inclusive goals *(i.e.* wind farm development working group, climate change, policy, management…)

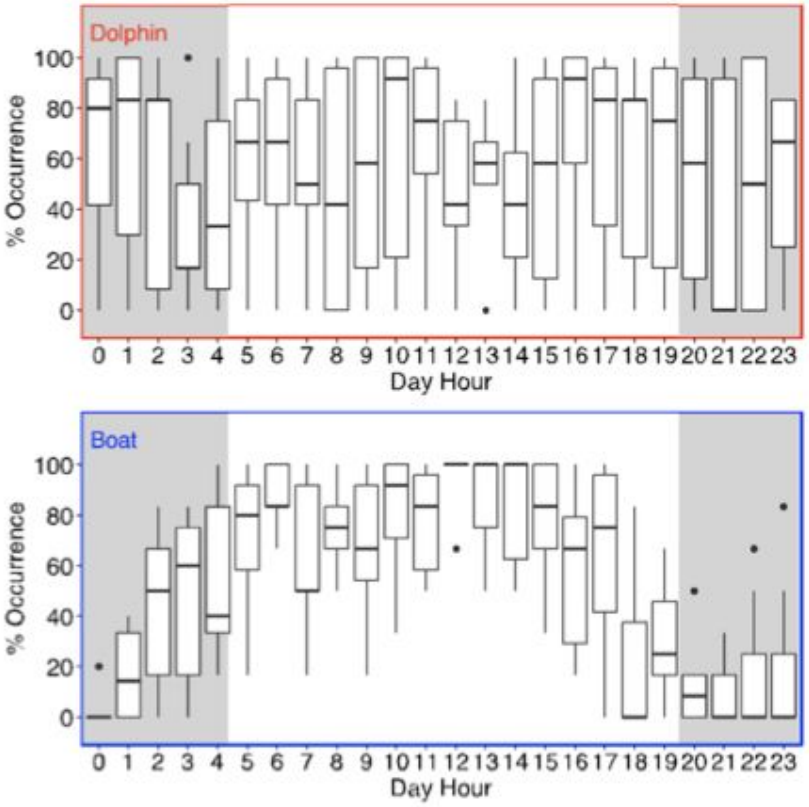
II. MABDC Funding for fieldwork, software, equipment analysis, student stipends to empower future generations, collaboration with state and federal agencies, policy and management and conference attendance, publications. IN A DREAM WORLD – tagging to identify alternative migratory routes (rivers?) and genetic sampling when possible from regional necropsy.

III. MABDC Guide / DATABANK - a guide for protocol, terminology, current and projected goals, and a catalog for deceased / neonate / young of year to establish better metrics for regional life history and movement patterns (protected areas, mitigate risk, habitat use, collaboration with rescue, response and necropsy events, aerial surveys, PSO reports during development activity)


Fall
Spring
Summer
Total # of seasonal sightings per year
100
90
80
70
60
50
40
30
20
10
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
Years

Year	No. of trips	No. of sightings	Survey hours	*Rate of occurrence	Total animals encountered	Mean group Size	Mean distance to shore (km)
2011	25	16	100	64.00%	919	58	11.19
2012	50	18	200	36.00%	951	53	7.72
2013	58	14	232	24.14%	352	25	7.29
2014	67	36	268	53.73%	1761	49	8.11
2015	67	33	268	49.25%	1957	59	6.94
2016	78	37	312	47.44%	1537	42	6.49
2017	94	92	376	97.87%	3426	37	7.41
2018	101	74	404	73.27%	2834	38	6.88
2019	97	92	388	94.85%	4472	49	7.81
Total	608	412	2,548	66.83%	18,209	46	7.76

North Atlantic – New York Bight - PAM



5. Co-occurrence of dolphins and boats at the reef: Probability of detecting dolphins was fairly uniform throughout the day (top left). Boats were most commonly detected in early morning and daytime (bottom left). Overlap between dolphins and boats occurred in 28.2% of all files and in 51.7% of files containing dolphin detections. Overlap was most frequent between 06:00-07:00 (66.7% of files) and 10:00-11:00 (66.7% of files). Dolphin detection was significantly higher (Pearson's Chi-squared test, X^2=100, p<0.0001) during weekdays (P=65.6%) than during weekends (P=29.4%). The opposite was true of boat detection, which was significantly higher (X^2=4.53, p=0.0332) during weekends (P=58.0%) than during weekdays (P=50.3%). The probability of detecting dolphin signals was not significantly different (X^2=0.38, p=0.537) between files where boat noise was present and absent. Similarly, probability of detecting dolphin signals was not significantly different under high-noise and low-noise conditions (X^2=2.14, p=0.14).

Wirth & Warren (2017)

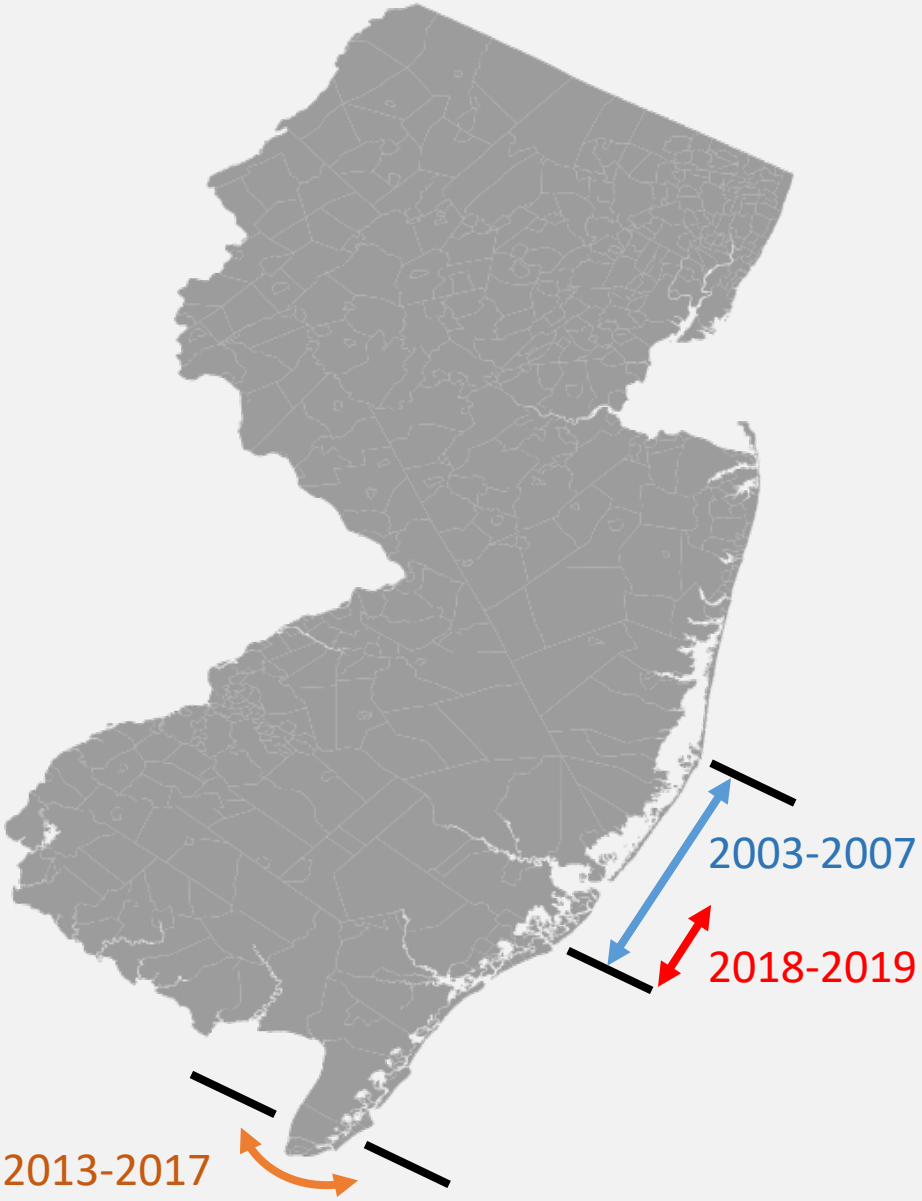
Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Jacalyn Toth Sullivan (Jackie Toth)
- Affiliation: Stockton University

Primary research objectives (2003-2007, 2013-2019):
- Seasonal occurrence, distribution patterns, site fidelity
- Population dynamics (intra-annual, annual)
- Behavioral, physical, ecological distinctions, population "sub-units"
- Undergraduate teaching

What methods do you use:
- Photo-ID
- Photo analysis
- Biopsy sampling (way back in 2005-6)

Survey area/geographic scope of effort



What three things should NMFS know about your work:

I: Not currently doing Tursiops work, but ready ☺

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: Northern New Jersey used to be the northernmost area of regular Tursiops occurrence – this seems to have shifted (southern NY/upper NYB now consistently see large numbers of Tursiops in summer). Who are these NY Tursiops -- are they seasonally resident?, or do they regularly visit NJ -- comprise one big transient seasonal population that travels between NY and NJ?

II. There seems to be finer-scale stock structure in NJ than simply 'inshore' and 'offshore' animals. Physical differences, behavioral differences, ecological differences, distinctly different movement patterns – all occurring between very nearshore animals (<2mi) versus more offshore animals (10-15mi). Is there a true distinction here, and is it coast-wide (in NJ, beyond)? Are these animals in different 'units'/'populations'/'stocks'/genetically distinct? Is this also true in the winter months when not in NJ, and where does each spend time?

III. How are Tursiops utilizing areas leased for wind-farms in NJ? We have broad-scale data on Tursiops habitat use along coastal NJ, but now that lease areas are narrowed down geographically, what are the fine-scale patterns of Tursiops within those areas?

What could be done to improve the efficiency of collaboration among research groups?

I: The MABDC is a huge step in that direction. This platform provides opportunities for data mining that didn't exist years ago.

Tursiops Research Workshop – Research Summary

Melissa Laurino
Cape May Whale Watch and Research Center
(NJ-CMWWRC)
Ongoing 2011-Present

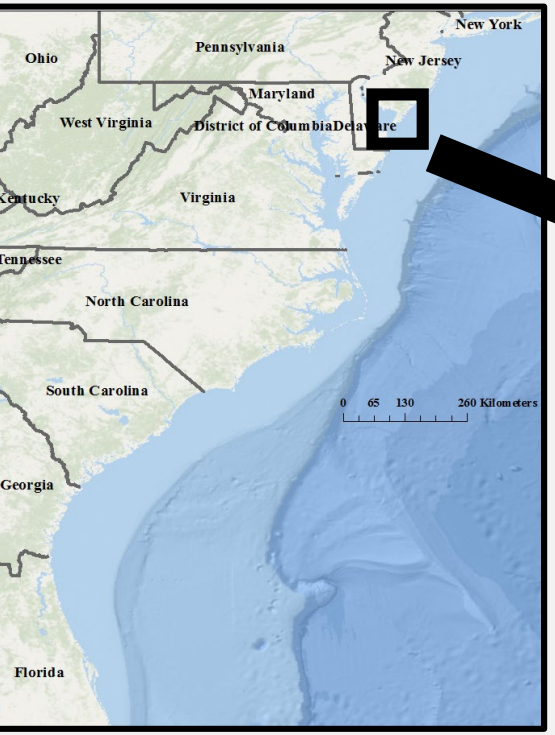
Primary research objectives:

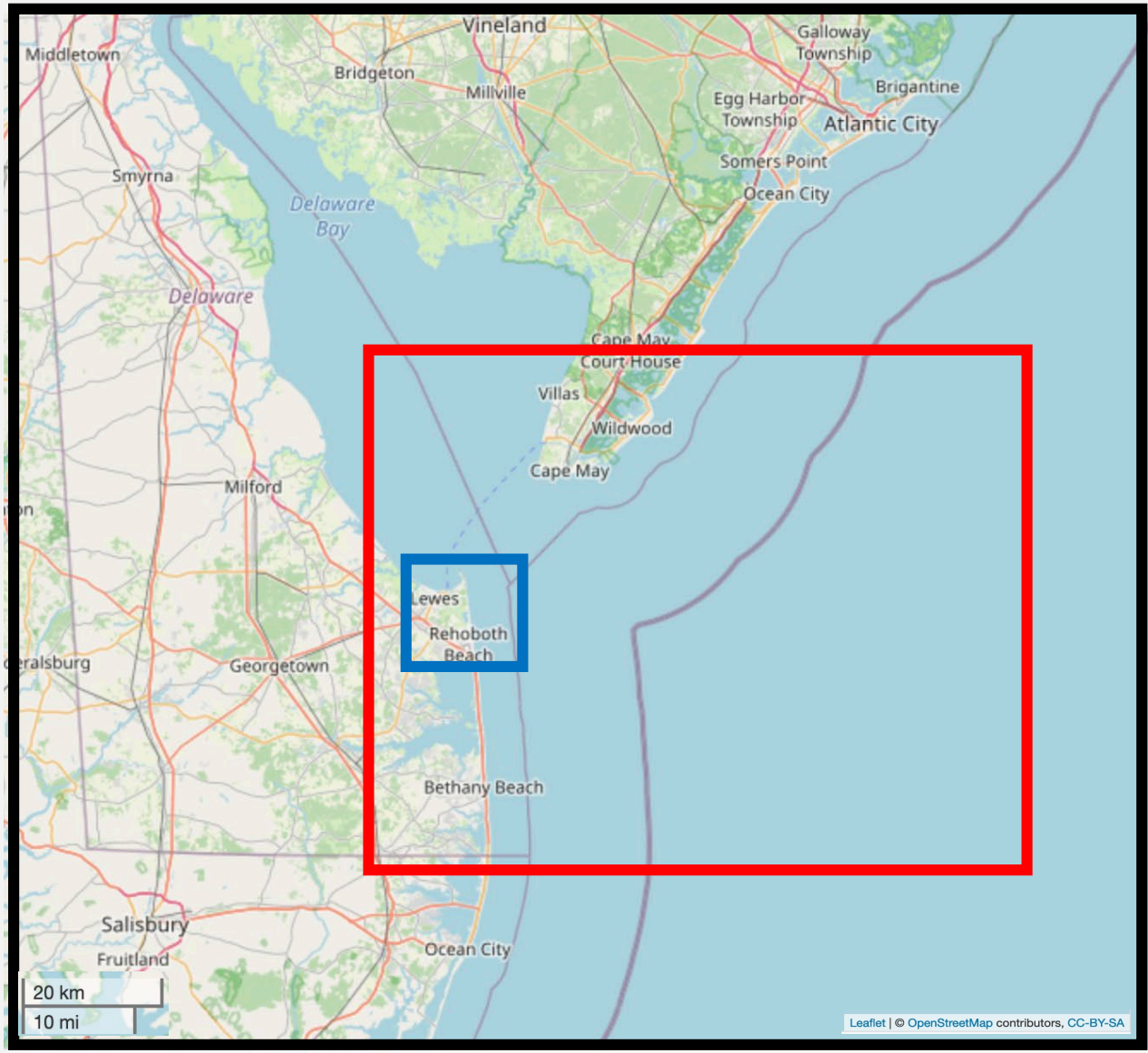
- Distribution and movement
- Population structure
- Social behavior
- Field pathologies

Methods:

- Photo-identification (Manual, finFindR, iMatch Software)
- 478 individuals

Cape May, New Jersey (NJ-CMWWRC) n=478, 2011-Present
Lewes, Delaware (DE-CMWWRC) n=261, 2017-2019





What three things should NMFS know about your work:

(NJ-CMWWRC)

I: Data Collection:

- March-December - 2hr, 2.5hr & 3hr whale and dolphin watches on the 100ft *American Star.*
- 12hr and 24hr Pelagic trips occur in May, August, October-December
- 350-375 total trips per season
- Variables: Weather conditions, sea conditions (Tide height, water temperature, depth, swell height), time, latitude, longitude, min/max pod size, neonate#, juvenile#, feeding, mating, behavior, direction, etc.

II: Other Catalogs: In addition to our Bottlenose dolphin catalog, we also have catalogs for our Humpback, Fin, Minke Whales, Pilot Whales, Common Dolphins, and Sperm Whales.

III: Although our route is opportunistic, our data collection effort is not. Currently, we are not operating under a NMFS permit, but in the future, we would like to begin dedicated surveys.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: Skin lesions as sentinels of the environment and stocks?

II. Is recreational vessel harassment and areas of high vessel traffic in seasonal areas impacting distribution?

III. Mixing of inshore coastal and offshore transient groups both inshore (<1km) and offshore (>5km)

What could be done to improve the efficiency of collaboration among research groups?

I: Hold more workshops like these in the future!

Melissa Laurino – MellsLaurino@gmail.com or Melissa.Laurino@Stockton.edu
@melissalaurino

Tursiops Research Workshop – Research Summary

- Name of Primary Participant: Gregory Silber
- Affiliation: Independent Researcher/Kutztown University Instructor
- Please acknowledge additional members from your program who are attending this workshop:

Primary research objectives:

Photo-ID as an education & research tool for student projects on local and regional movements, mark-recapture

What methods do you use:

Boat-based Photo-ID; land-based local movement and behavior studies

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort.

Assateague/Chincoteague, VA

What three things should NMFS know about your work:

I:

II.

III.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I:

II.

III.

What could be done to improve the efficiency of collaboration among research groups?

I:

II.

III.

Tursiops Research Workshop – Research Summary

- **Dr. Janet Mann (Director, Professor)**
- **Potomac-Chesapeake Dolphin Project, Georgetown University**
- **Ann-Marie Jacoby (Associate Director, Duke University)**

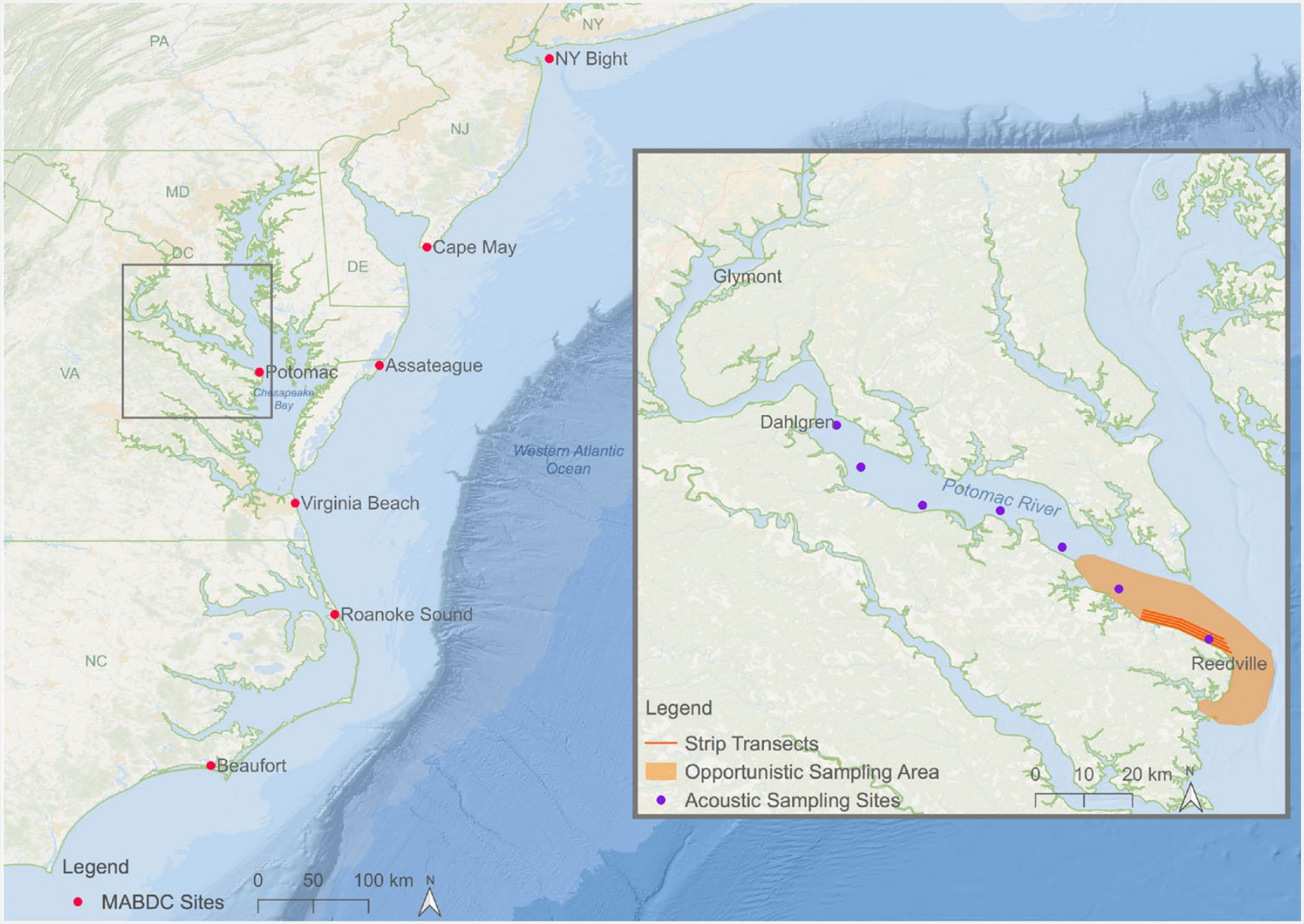
Primary research objectives:

(1) Population(s)/stock(s) in the Bay
(2) Who, what, where, when, and why are dolphins coming into the Potomac River and middle Chesapeake
(3) Disease modeling to better understand UME
(4) Risks to dolphins in the area

What methods do you use:

(1) Strip transects and opportunistic surveys (observational)
(2) Photo ID
(3) Focal Follows
(4) Acoustic deployments (C-Pods, Sound Traps)

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



What three things should NMFS know about your work:

I: Our data will yield important insights concerning the baseline population in the Potomac-Chesapeake (# unique individuals, resight rate/residency patterns including seasonality, movement patterns & distribution via acoustics and MABDC for stock assignment, demographics: age-sex structure, calving seasonality).

II. Use of behavioral, image, and acoustic data to understand health and status of Potomac-Chesapeake bottlenose dolphin population (foraging, mating-social, breathing synchrony). For example, we are using synchronized breathing and contact rates for dolphins within this area, combined with population structure data from MABDC matches to determine how disease spreads throughout the mid-Atlantic and US Eastern Seaboard (disease network modeling).

III. Everyone wants to know if dolphins are 'coming back' to the area and if so, why. We are examining local archives (e.g., newspaper, scientific databases) and conducting a Local Ecological Knowledge study involving local fishers to determine changes in dolphin occurrence over time.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: What is the contact structure between subpopulations or stocks? Are populations mixing, especially during the breeding season? If so, where? What methods are most valuable to NMFS for determining stock structure?

II. Are some stocks/subpopulations more vulnerable than others due to human interaction noise or other pollution, or disease risk?

III. What are the *primary* threats to bottlenose dolphins based on stock membership? Can these be mitigated?

What could be done to improve the efficiency of collaboration among research groups?

I: More workshops like this one hosted and biannual presentations or updates from the various research programs along the eastern shore.

II. Financial-research support will also incentivize cooperation and collaboration as that would help speed up data processing. Lack of funding is a serious stumbling block as the work is highly labor-intensive.

III. Related to funding, what funding mechanisms are available for this type of work? Is this type of work a priority for any current NOAA NMFS funding opportunities?

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : **Helen Bailey**
- Affiliation: **University of Maryland Center for Environmental Science**
- Please acknowledge additional members from your program who are attending this workshop: **None present (not attending J. Testa, L. Rodriguez, A. Fandel, K. Silva and B. Colbert)**

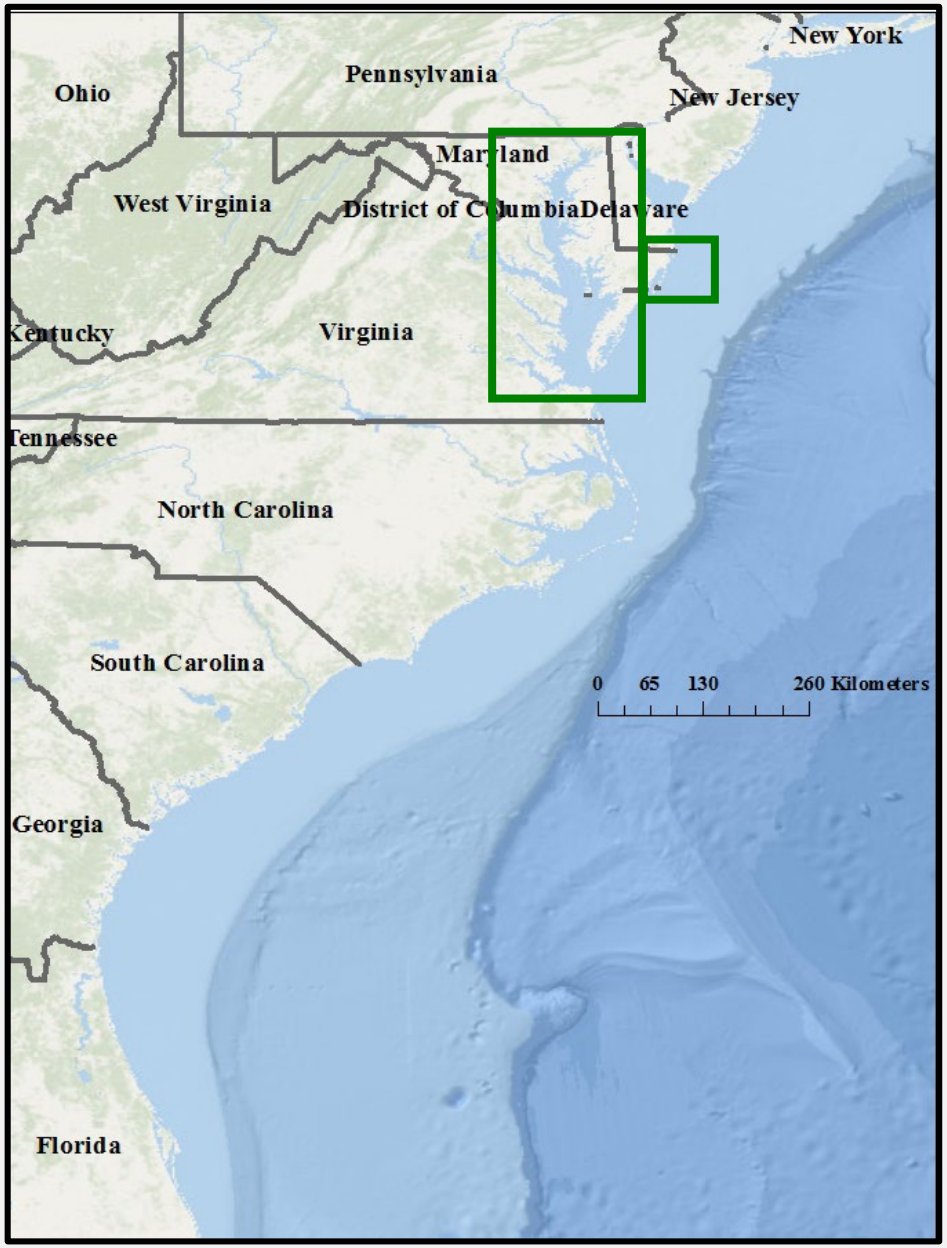
Primary research objectives:

- Spatiotemporal distribution of bottlenose dolphins in the Chesapeake Bay (Rodriguez et al. 2021, PLoS ONE 16: e0251637).
- Occurrence and behavior of bottlenose dolphins off the Mid-Atlantic coast (Bailey et al. 2019, Ecology 100: e02743).
- Movements of bottlenose dolphins between the Chesapeake Bay and along the Mid-Atlantic coast (Bailey et al. 2021, Ecosphere 12: e03685).

What methods do you use:

1. Volunteer-based sightings reported through our Chesapeake DolphinWatch App.
2. Passive acoustic monitoring – echolocation click detections and signature whistle identification.
3. eDNA metabarcoding sampling for dolphins and other vertebrate species.

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



What three things should NMFS know about your work:

I: Two new published papers this year on bottlenose dolphins in the Chesapeake Bay and off the coast of Maryland that are both open access (Rodriguez et al. 2021, PLoS ONE; Bailey et al. 2021, Ecosphere).

II. Bottlenose dolphins are regular inhabitants of the Chesapeake Bay based on data over a 5-year period. We identified over 300 individuals in 2018 based on their signature whistles and the number continues to grow as we analyze more data.

III. Using matched signature whistles, we have identified individuals moving between the Chesapeake Bay and the Atlantic coast of Maryland (up to 30 km offshore).

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: How do the observed distribution and movement patterns relate to stock structure?

II. How many dolphins occur in the Chesapeake Bay?

III. What stock(s) are dolphins in the Chesapeake Bay from?

What could be done to improve the efficiency of collaboration among research groups?

I: Email group or web-based group forum to provide updates on new findings and published papers.

II. Annual or bi-annual virtual workshop.

III. Funding opportunities that encourage collaboration among research groups.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Amy Engelhaupt
- Affiliation: HDR Inc. / Amy Engelhaupt Consulting
- Please acknowledge additional members from your program who are attending this workshop:

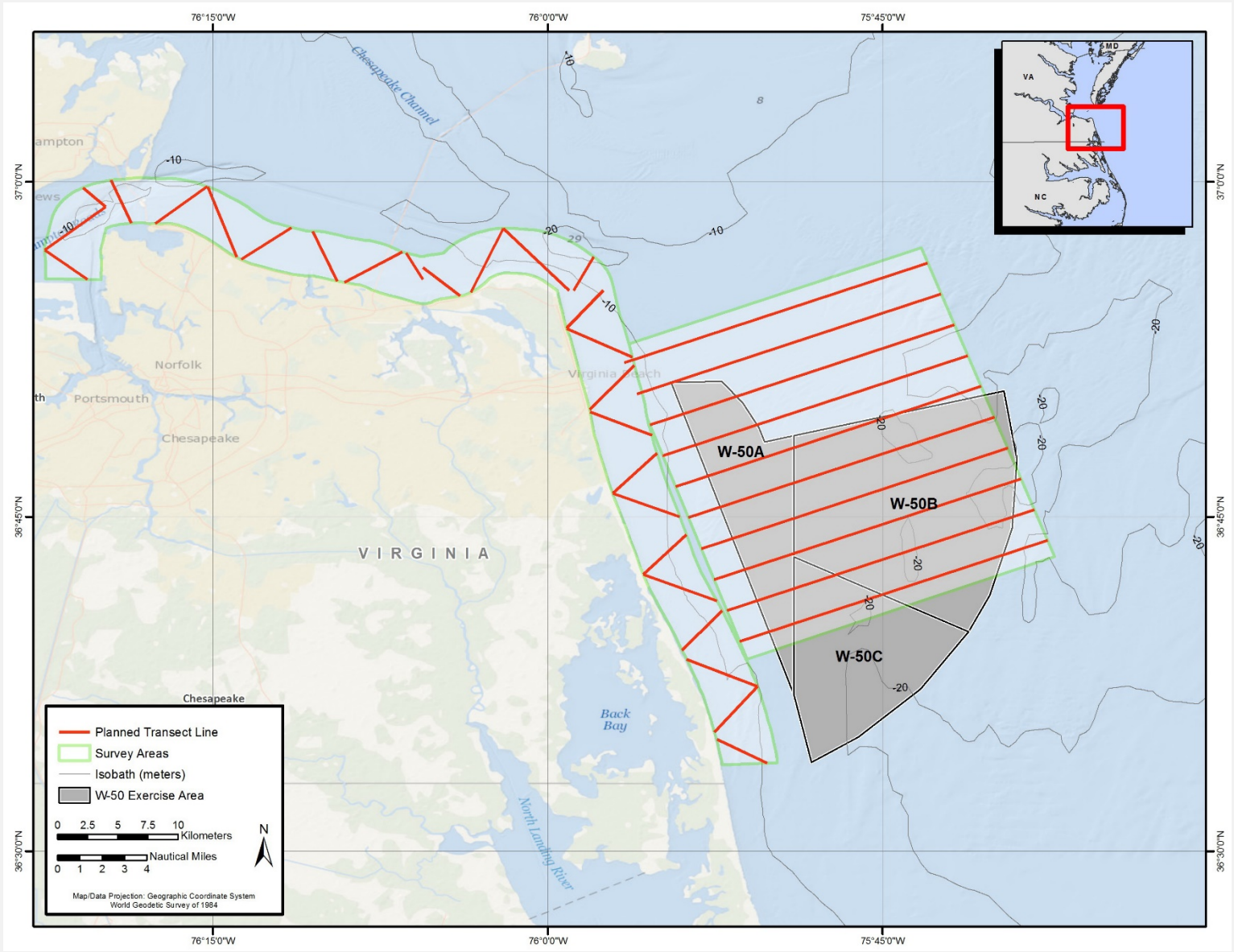
Primary research objectives:

Provide quantitative data and information on the seasonal occurrence, distribution, and density of marine mammals in the nearshore VA waters near U.S. Navy installations and training ranges, including NSN, JEB-LC, JEB-FS, and the MINEX W-50 area.

What methods do you use:

1. Monthly Vessel Line-transect Surveys
2. Monthly Photo-ID Surveys
3. C-POD click detectors

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



What three things should NMFS know about your work:

I:

Estimated Tt abundance varied by season with peak in warm-water season, as expected, however cold-water season presence was documented.

II.

Photo-ID catalog re-sight rate was low (17%).

Seasonal site fidelity was evident, primarily seen during summer and fall months in the 'Cape Henry' region.

III.

88% of 'outer coastline' IDs were sighted during fall or winter months.

Two 'OC' individuals were matched to PAX catalog animals, sighting during summer months to the north (mid-Chesapeake Bay, >130km apart).

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I:

Do boundaries of the current stocks need to be adjusted, or perhaps (following further evaluation) a new stock designated?

II.

III.

What could be done to improve the efficiency of collaboration among research groups?

I:

MABDC is already a great tool for collaboration, and this workshop will likely prompt additional ideas for future work. Additional opportunities to share results not yet published such as this could help.

II.

More funding for all research groups ;)

III.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Jessica Taylor
- Affiliation: Outer Banks Center for Dolphin Research

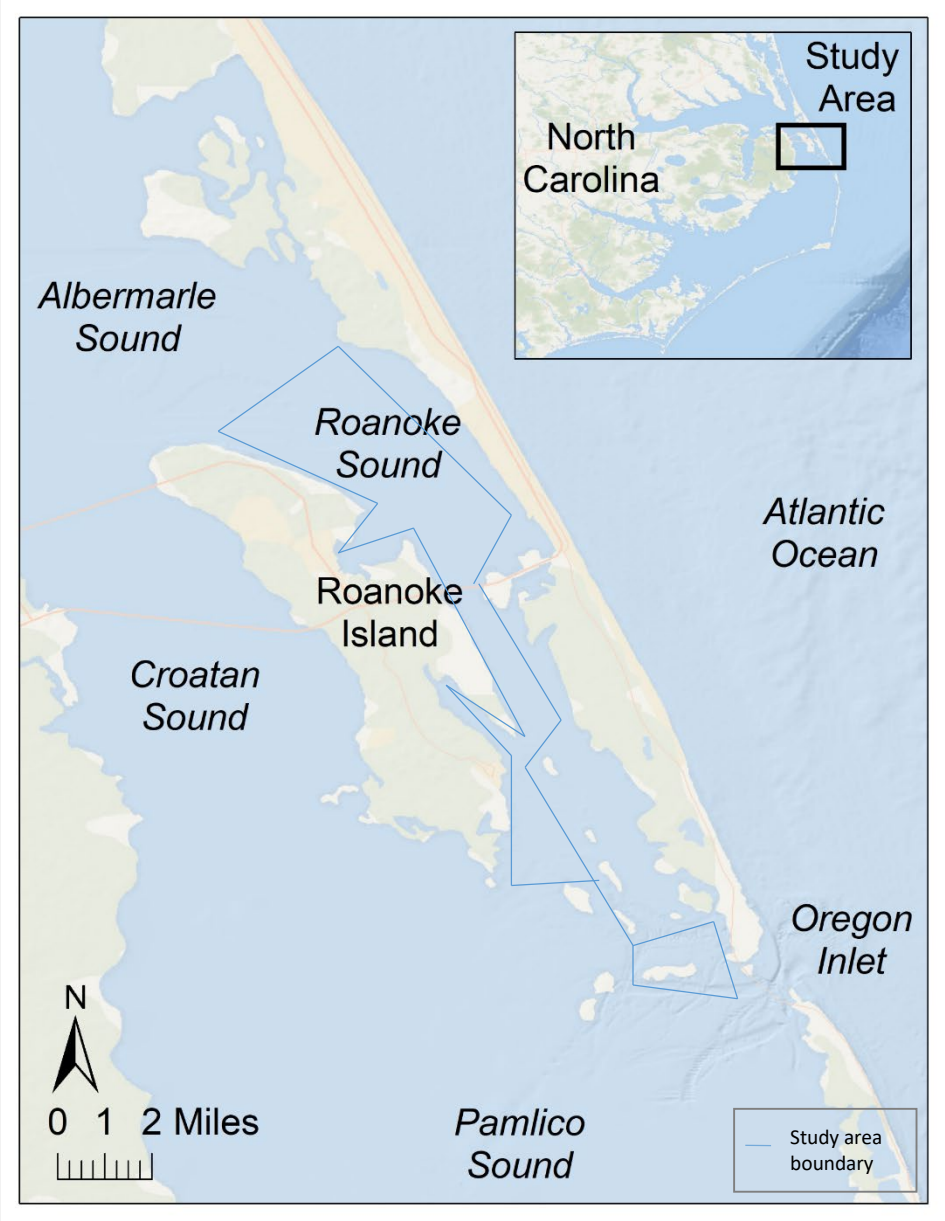
Primary research objectives:

Our primary research objectives are to monitor the abundance trends, demographics, and ecology of bottlenose dolphins in Roanoke Sound, NC, in order to contribute to further understanding stock structure and promote conservation.

What methods do you use:

Our primary field research method is boat-based photo-identification. We conduct standardized dedicated transect surveys in the sound and opportunistic observations aboard eco-tours. Our data is processed and stored using FinBase.

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



What three things should NMFS know about your work:

I: Roanoke Sound is an important site for documenting seasonal movements of the NNCES stock. We have observed significant seasonal exchange between Roanoke Sound and the Beaufort, NC area, and moderate exchange between Roanoke Sound and southern VA sites. Of the known sex individuals matched to VA, only females have been matched.

II. Bottlenose dolphins in Roanoke Sound exhibit a variety of site fidelity patterns with the majority of individuals exhibiting low site fidelity. Many high and moderate site fidelity individuals have been assigned to NNCES stock.

III. The Outer Banks Center for Dolphin Research provides a significant resource for undergraduate and graduate research. Since 2010, 16 undergraduate and 7 graduate (5 master, 2 doctoral) projects have been completed. Projects focus on understanding stock structure, habitat use, skin lesions, *Xenobalanus* loads, and foraging ecology of dolphins in Roanoke Sound.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: How did the 2013 UME impact abundance estimates in Roanoke Sound, and will future epidemics and changing environmental conditions have similar effects?

II. How do prey fish distributions drive dolphin distributions and abundances in the sound, and how will these distributions be affected by changing climate over time?

III. To which stocks do transient individuals sighted in Roanoke Sound belong and where else do these individuals range? And why are we only matching females to Virginia catalogs?

What could be done to improve the efficiency of collaboration among research groups?

I: Annual meetings/workshops (virtual or in-person) would foster collaboration among photo-id catalog contributors.

II. An automated program that contributors could use to assist with matching to the MABDC. This would increase efficiency of matching and promote increased opportunities for collaboration.

III. A social media site or website for researchers to post updates would encourage collaboration as well.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Andy Read
- Affiliation: Duke University
- Please acknowledge additional members from your program who are attending this workshop: Tom Schultz
  Ei Fujioka
  Kim Urian

Primary research objectives:

Estimation of abundance, population structure, distribution & movements, by-catch mitigation trials, feeding ecology.

What methods do you use:

Photo-ID, capture-recapture and line-transect surveys, passive acoustic monitoring, biopsy sampling, behavioral observations/focal follows, satellite telemetry, stable isotope analysis, genetics, baseline population monitoring, opportunistic efforts.

Duke | NICHOLAS SCHOOL of the ENVIRONMENT
Duke University Marine Lab

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort.

DUML Sightings:

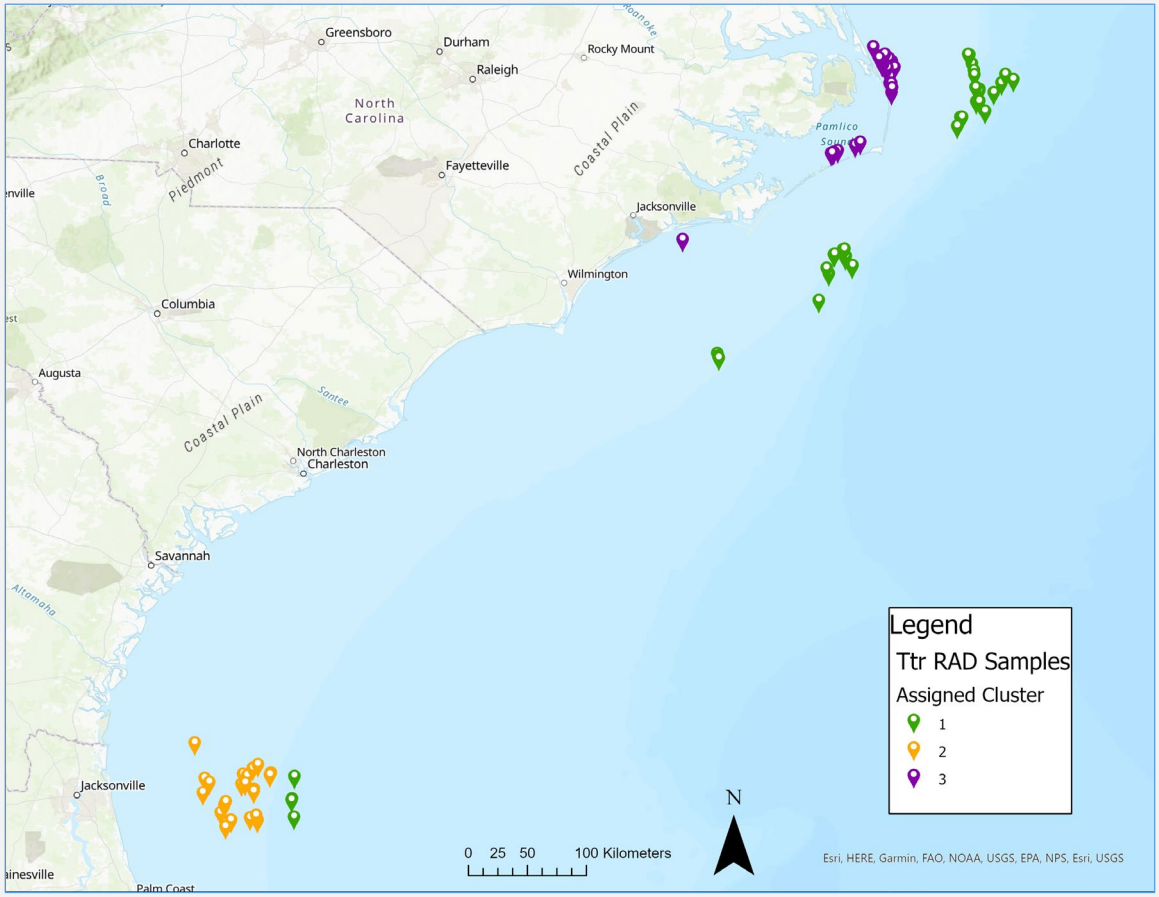
2,767 sighting locations of bottlenose dolphins (both coastal & pelagic morphotypes) from July 1995 to July 2021

What three things should NMFS know about your work:

I: The questions we address are complex. So, to meet these challenges we have a long history of collaboration with many other research groups, sharing information, samples, and images of live and stranded dolphins.

What three things should NMFS know about your work:

II. We are using molecular techniques to examine population structure of *Tursiops* along the eastern seaboard.



What three things should NMFS know about your work:

III. We have the resources (vessels, personnel, experience and techniques) to examine population identity of bottlenose dolphins in shelf waters from VA to FL.

Filtered locations from satellite-tagged pelagic *Tursiops* off Cape Hatteras in 2014 (n=5) and 2015 (n=4).

Baird, R.W., D.L. Webster, Z. Swaim, H.J. Foley, D.B. Anderson, and A.J. Read. 2016. Spatial Use by Odontocetes Satellite Tagged off Cape Hatteras, North Carolina in 2015. Final report. Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: What is the northern limit of estuarine dolphins during winter? Are the dolphins in the Chesapeake Bay part of the NNCES?

II. What were the effects of the recent morbillivirus epizootic on the abundance of coastal and estuarine stocks? And what is the current abundance (and PBR) of the SNCES?

III. Does the SM stock really exist? And is it migratory?

What could be done to improve the efficiency of collaboration among research groups?

I: Incorporate finFindR into the MABDC OBIS-SEAMAP website to improve efficiency of matching for all contributors.

II. Facilitate exchange of biopsy samples and associated images to complement photo-ID analysis.

III. We should pool the considerable resources of our research community. NMFS should fund research projects conducted by other research groups to improve our understanding of population structure and abundance.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Annie Gorgone
- Affiliation: SEFSC MMTD
- Please acknowledge additional members from your program who are attending this workshop: Mridula Srinivasan, Lance Garrison, Patty Rosel, Jenny Litz, Nikki Vollmer

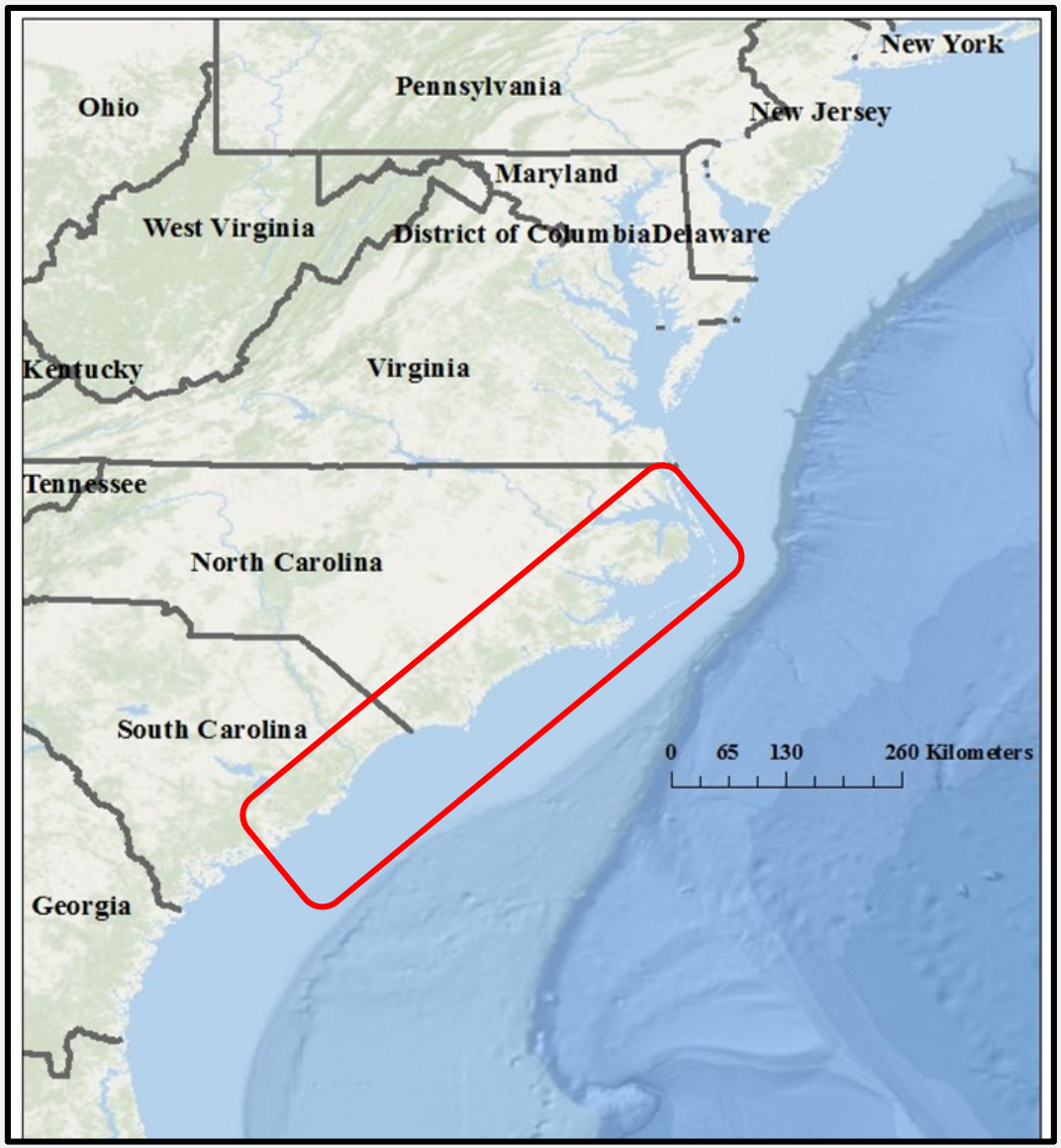
Primary research objectives:

Population estimates
Stock structure
Distribution and movements

What methods do you use:

Photo-identification
Biopsy – Genetics

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



What three things should researchers know about your work:

I: Work in this region has primarily been conducted in NC and has been highly intensive for small periods of time by focusing on population estimates or biopsy sampling.

II. NMFS has an ongoing need to understand bottlenose dolphin stock structure and movement patterns along the US east coast to inform MMPA required stock assessments and take reduction teams.

III. NMFS has been working with several groups to integrate automated matching tools (e.g., FinFindR) into the photo-id matching and data analysis and is interested in expanding the application of these tools

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: Distribution? How does the spatial distribution of the SNCES, NNCES, Southern Migratory and Northern Migratory bottlenose dolphin stocks vary seasonally and inter-annually. Can a comprehensive analysis of photo-id data provide insight into these seasonal movements?

II. Abundance? What is the current population size of the SNCES and NNCES bottlenose dolphin stocks?

III. Stock structure? Do the currently defined bottlenose dolphin stocks accurately reflect the demographically independent population units along the U.S. east coast?

What could be done to improve the efficiency of collaboration among research groups?

I: The ability to use new technologies (e.g. Flukebook, finFindR, CurvRank) between research groups to make matches more quickly and share information.

II.

III.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : **Rob Young**
- Affiliation: **Coastal Carolina University**
- Also Attending: **Dani Silva**

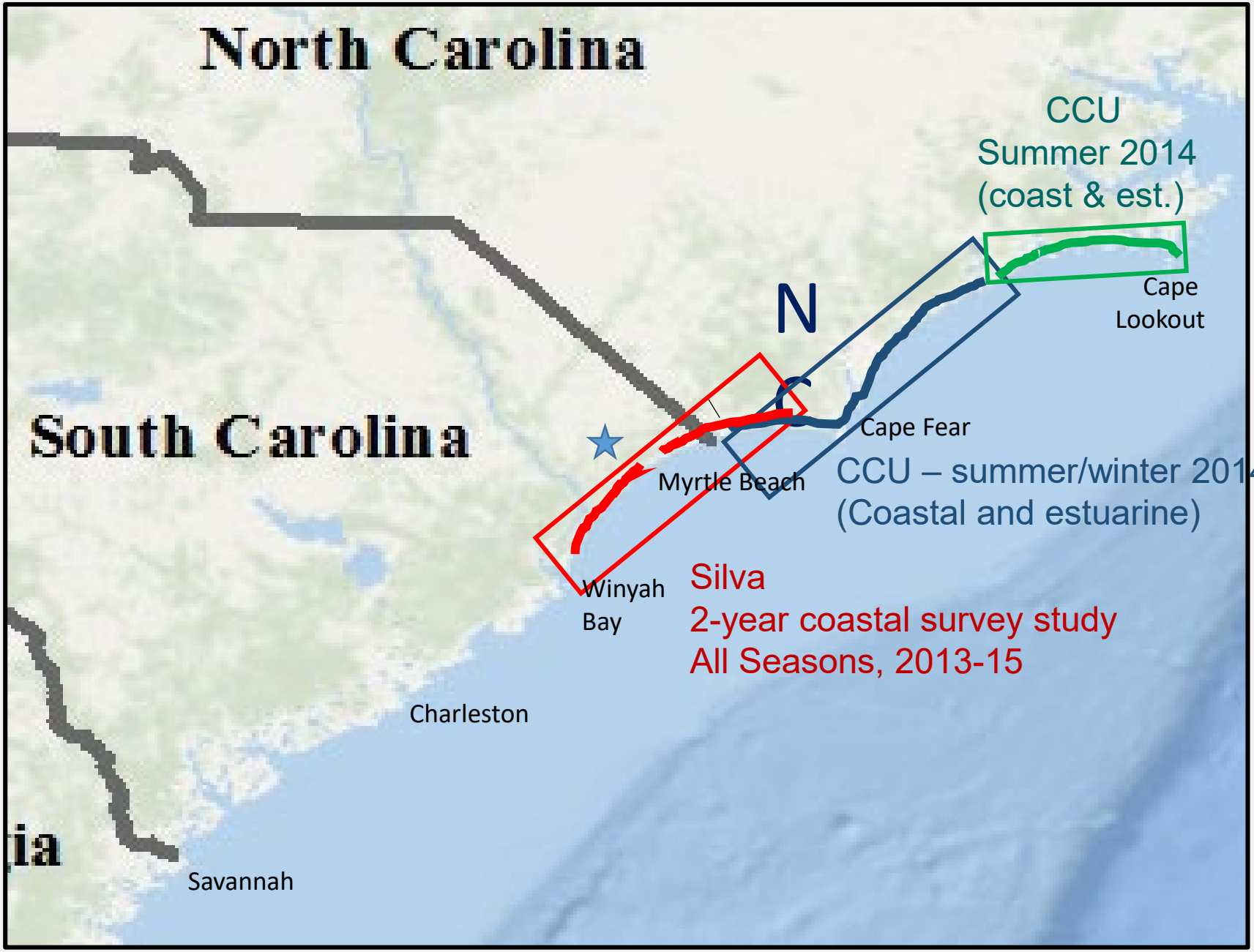
Primary research objectives:

- Long term: ecology/behavior of *Tursiops* in SC salt marsh systems/estuaries (bioenergetics, predator-prey, distribution, social structure)
- Since 2013: Tursiops stock structure (abundance, range) – SC estuarine stocks, SNCESS, coastal stocks of northern SC and southern NC

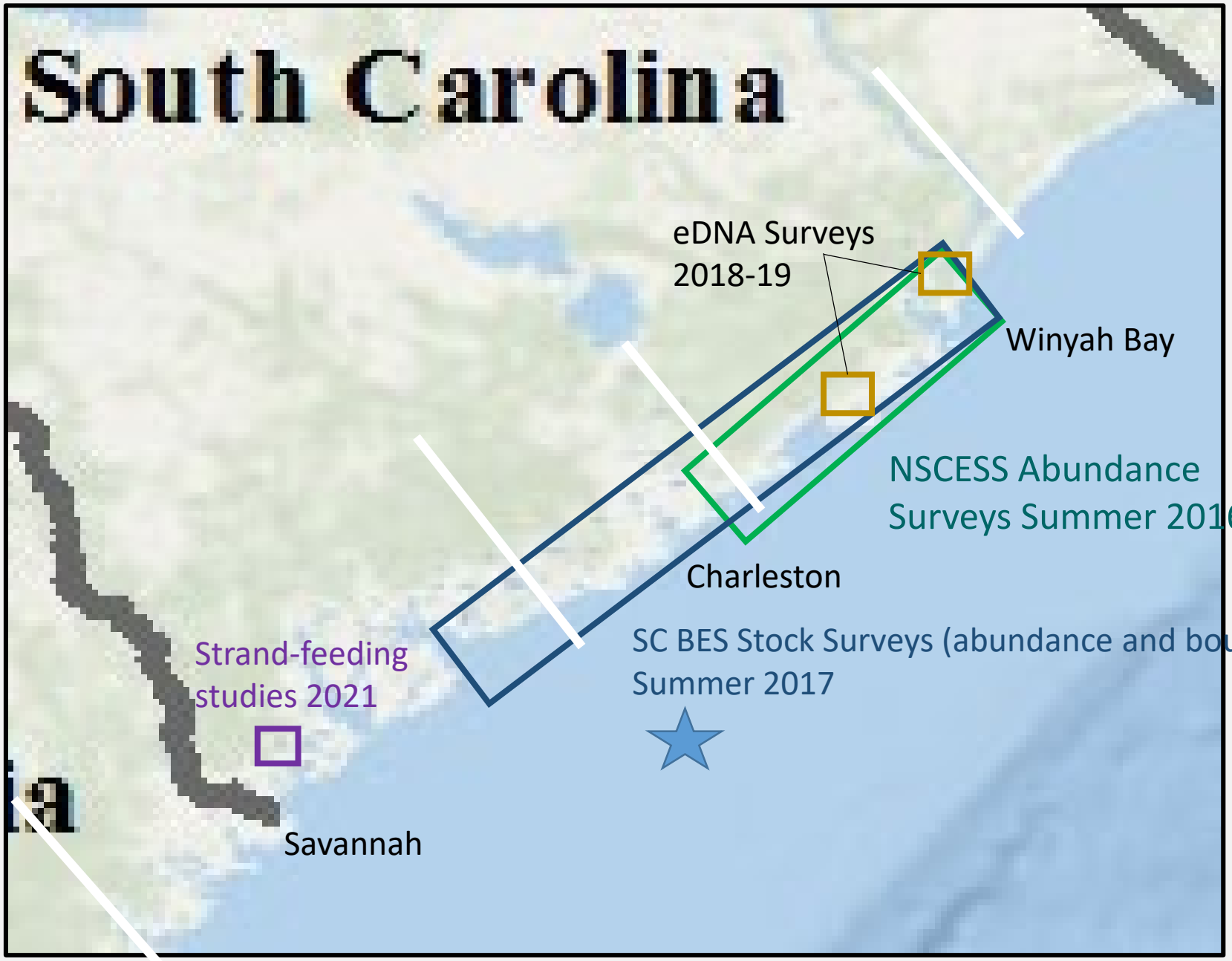
What methods do you use:

- Stock surveys: photo-ID transects, MABDC
- Ecology/behavior: photo-ID focal follows and transects (some hydrophone, stable isotopes, eDNA)

Area and Effort – Coastal and SNCESS Surveys



Area and Effort – SC Estuarine Surveys



What three things should NMFS know about your work:

I: Unique comparative insights after 15 years focused on estuarine dolphin ecology/behavior followed by stock abundance/range studies for both coastal and estuarine stocks in SC/NC.

II. Coastal surveys focused on transition Zone between migratory and non-migratory stocks – likely revisions/updates/new stock? needed to our understanding. Silva et al manuscript in prep sheds light on some details of Southern Migratory Coastal stock.

III. Still to analyze and about ready for it: 6 complete repetitive surveys of SC estuarine for 2 SC estuarine stocks (NSCESS, CESS) from 2017 (warm season)

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: Where do the Southern Coastal Migratory Stock dolphins go in winter? How far south? How concentrated vs. widely dispersed? What is the route of their northern migration? (in SC, they are obvious heading south and we never catch them coming back up in spring)

II. Estuarine dolphin movements and distribution/interactions are very different in the extensive salt marsh systems of SC and GA than they are in the NC estuaries. Observations suggest that NC stocks likely reflect actual populations. This really hasn't been investigated for SC/GA estuarine stocks and needs to be critically examined.

III. Given the challenges of correctly identifying true population boundaries when defining a stock, and the challenges of generating a reliable population estimate with a small CV, is the stock abundance the best metric for making management decisions? Is it possible that it may be good for some systems but not others?

What could be done to improve the efficiency of collaboration among research groups?

I: More meetings like this workshop

II. Provide funding for a designated photo-ID manager who can make sure catalogs are maintained, up to date and shared.

III.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant: Todd Speakman
- Affiliation: National Marine Mammal Foundation (Charleston, SC)
- Please acknowledge additional members from your program who are attending this workshop: Brian Balmer; Lori Schwacke

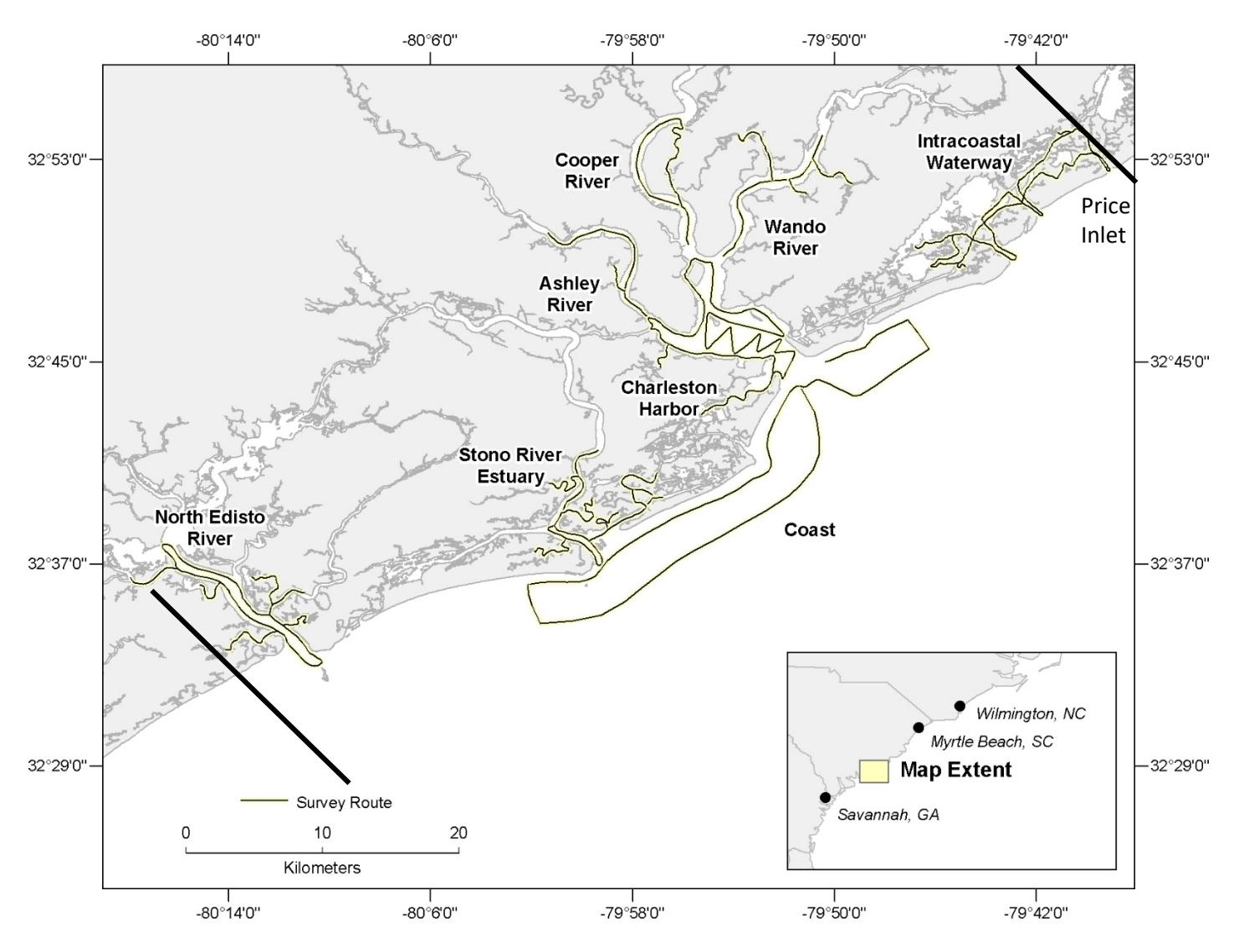
Primary research objectives:

- Collect baseline data (abundance, distribution, health, ranging patterns, and site fidelity) on stocks of interest in the southeastern U.S.
- Apply these baseline data to identification and mitigation of stressors that these stocks are exposed to

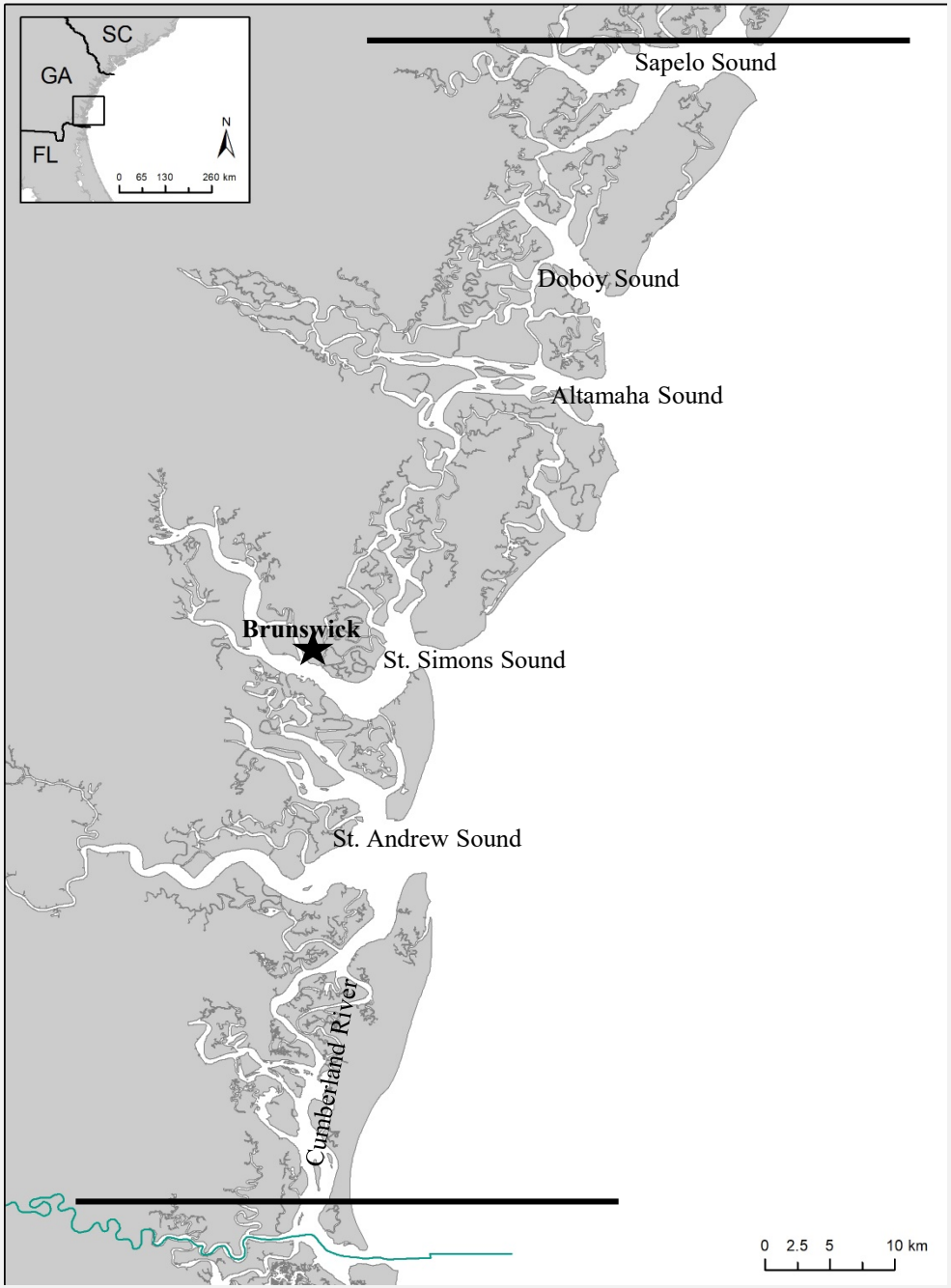
What methods do you use:

- Photo-ID, remote biopsy, health assessments, telemetry, and collaboration with stranding networks for life-history

Survey area/geographic scope of effort (CES)



Survey area/geographic scope of effort (SGA)



What three things should NMFS know about your work:

I: Long-term multi-faceted approach to data collection and analyses with over 4,000 individuals between the CHS and SGA catalogs combined, both of which have been submitted to the MABDC.

II. Focused on baseline data collection and extrapolating these results to identify anthropogenic stressors impacting a given stock and/or study area.

III. All data are entered into Microsoft Access databases with the goal of integration across types of sampling (photo-ID, remote biopsy, tagging, capture-release assessment, stranding response) and subsequent results (abundance, distribution, health, ranging patterns, site fidelity, life history), to compare populations/study areas and facilitate collaboration with other research partners.

What are the most important outstanding questions regarding distribution, abundance, and stock structure?

I: *Distribution*: What are the spatial and temporal bounds of migratory stocks and to what extent and where do they interact with other CST and BSE stocks? Better understand the range and stock boundaries of BSE dolphins and rates of immigration and emigration.

II. *Abundance*: How can we develop survey designs and analysis methods that are optimal for stocks with differing ranging patterns and habitats.

III. *Stock structure*: Are geographic boundaries the right criteria for stock delineations and the ability to collect a sample from a given individual animal and correctly identify that individual to its respective stock?

What could be done to improve the efficiency of collaboration among research groups?

I: More communication with fellow researchers. Perhaps a monthly webinar where an individual researcher/research group spotlights a current project that is followed up with discussion by other researchers in the region and create a list serve for sharing sampling methods and recent publications.

II. Incorporate finFindR into the MABDC so all researchers can utilize the tool to facilitate more matches between groups.

III. Conduct integrated and coordinated survey efforts and/or analyses to address specific management questions.

Tursiops Research Workshop – Research Summary

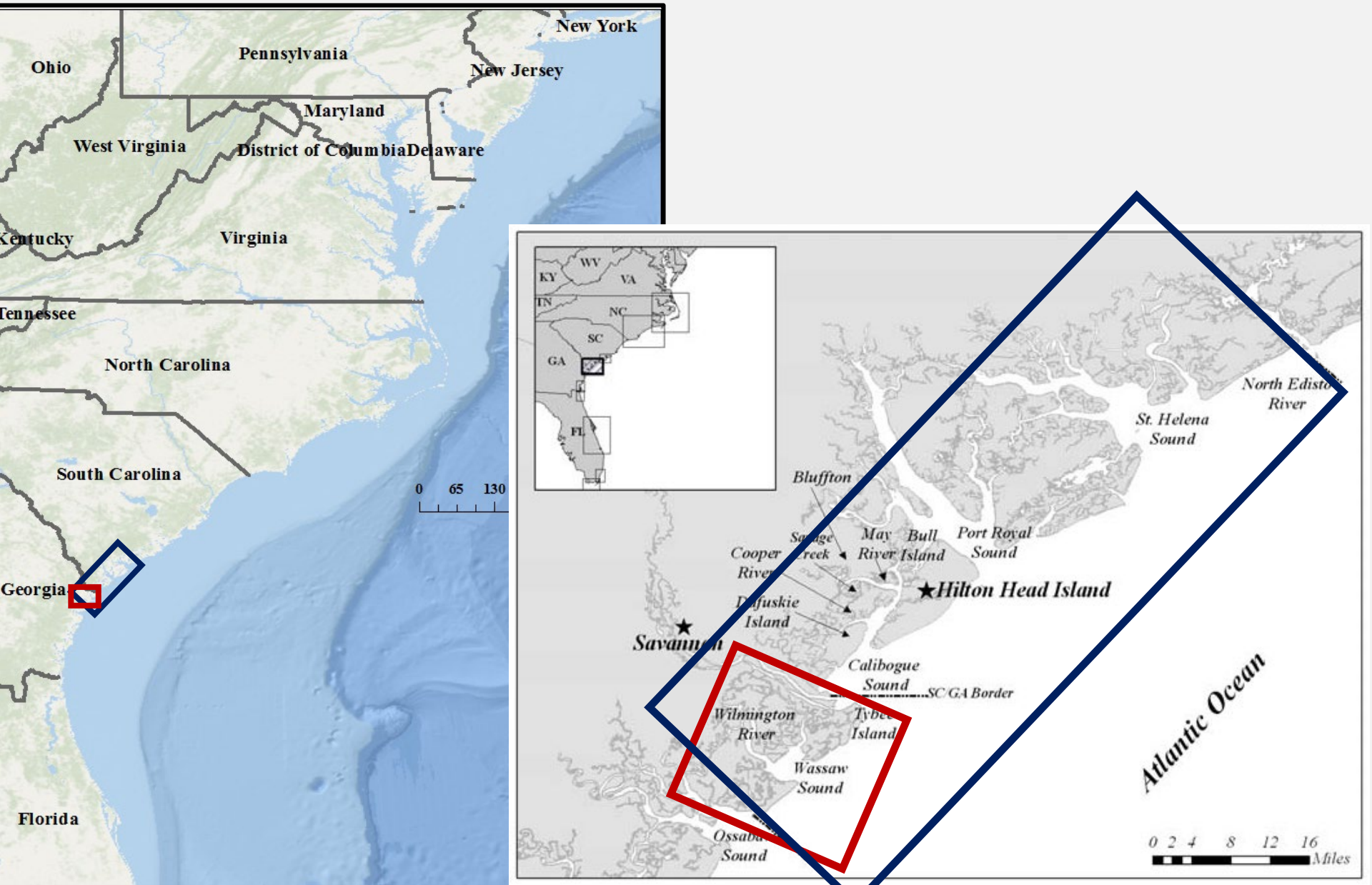
- Name of Primary Participant : Dr. Tara Cox
- Affiliation: Savannah State University, Savannah, GA
- Please acknowledge additional members from your program who are attending this workshop: Robin Perrtree

Primary research objectives:
Monitor the estuarine dolphins in our area: southernmost region of the Northern Georgia/Southern South Carolina Estuarine System Stock

What methods do you use:
Photo-Identification (long-term; 12 years)
Biopsy sampling (genetics, POPs, mercury)

Northern Georgia/Southern South Carolina Estuarine System Stock

Savannah, Georgia



What three things should NMFS know about your work:

I: We have over 10 years of photo-identification data for the Savannah area.

II. Our dolphin abundance doubles in the summer; we do not know where they go in the winter (this may be a difference between coastal and BSE animals?).

III. We are working on matching to researchers north (within NGSSCES stock) and south (Central Georgia Estuarine System Stock); we've found few matches in each direction (most matching occurring via MABDC).

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: Are our northern Georgia dolphins really the same population/stock as those in southern South Carolina?

II. We have no official abundance estimate for our region or the NGSSCES stock as a whole.

III. How to define resident individuals and examine site fidelity especially with regards to the observed differences in summer vs. winter usage of the estuary.

What could be done to improve the efficiency of collaboration among research groups?

I: Analysis support – both statistical support as well as helping frame our research in useful ways for NMFS (e.g., why is there an emphasis on coastal animals south of Charleston and should we re-focus our efforts in coastal waters?).

II. Funding for graduate students and researchers to spend time matching between study areas (e.g., MABDC).

III. Host more workshops and encourage participation in regional conferences, such as SEAMAMMS.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Steve Burton
- Affiliation: Florida Atlantic University Harbor Branch Oceanographic Institute

Primary research objectives:

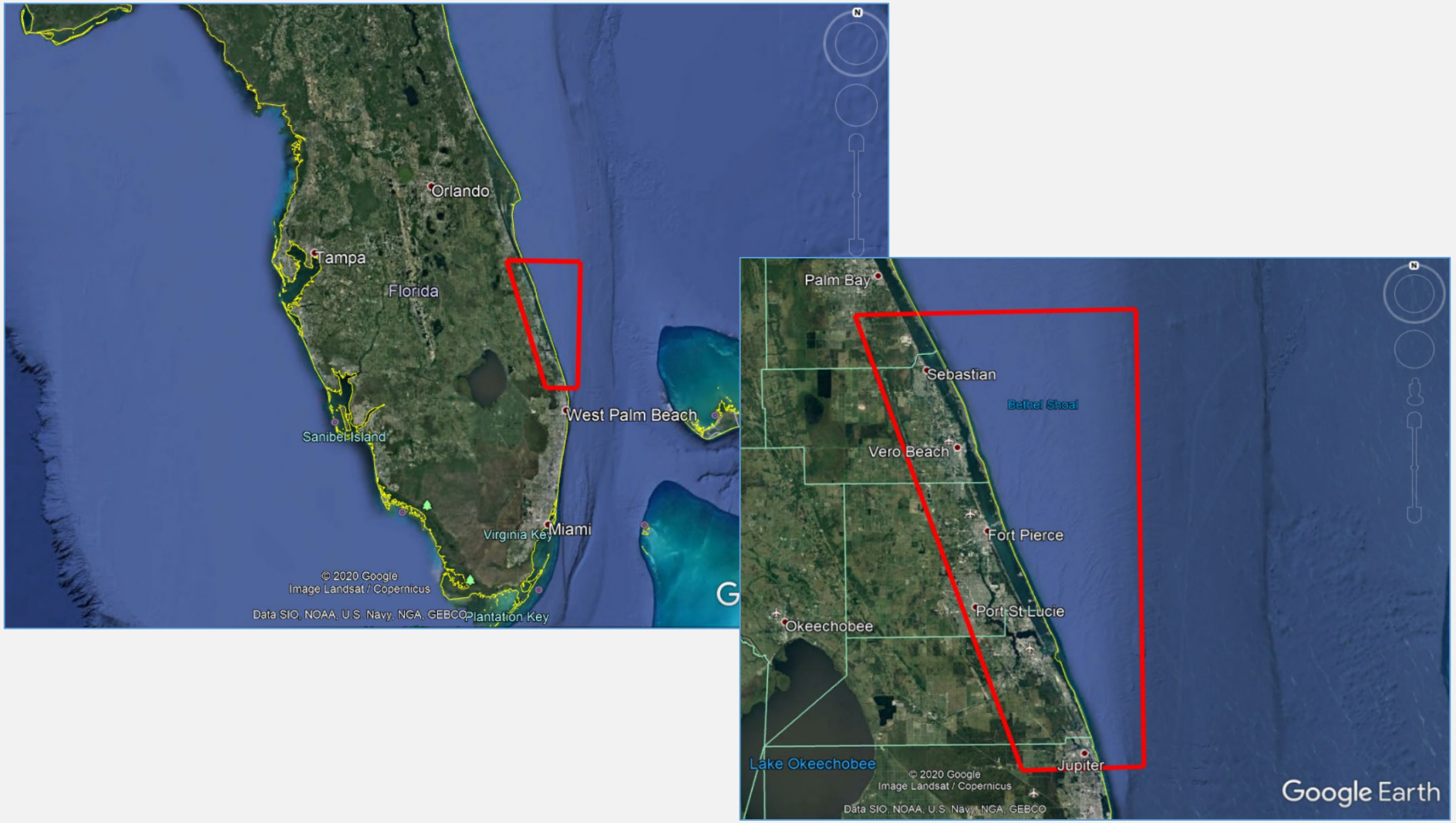
1. Using photo analysis of Indian River Lagoon (IRL) and Atlantic Ocean cetaceans to assess cetacean health
2. Life history
3. Human interaction occurrences
4. Accumulating baseline data for multiple species

What methods do you use:

1. Monthly standardized line transect surveys
2. Opportunistic effort

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY

What three things should NMFS know about your work:

I: FAU Harbor Branch runs monthly Photo ID transect surveys throughout the year in the Indian River Lagoon and the Atlantic Ocean, depending on weather and sea-state.

II. The FAU Harbor Branch team also responds to all the dolphin and whale stranding calls within our research area. The stranding and photo ID work compliment each other to accomplish our research goals.

III. We will be adding our images and data to the MABDC and OBIS-SEAMAP.

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY®

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: What are the spatial-temporal distributions of various cetacean species observed (within our study area)?

II. How many cetaceans are utilizing the habitat within our study area?

III. Are there inter- and intra-species overlap (within our study area)?

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY®

What could be done to improve the efficiency of collaboration among research groups?

I: We are new to this working group so its our job to let everyone know we are here in Southeast Florida. We would love to collaborate with other groups studying not only Atlantic bottlenose dolphins but other cetacean species as well.

II.

III.

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY®

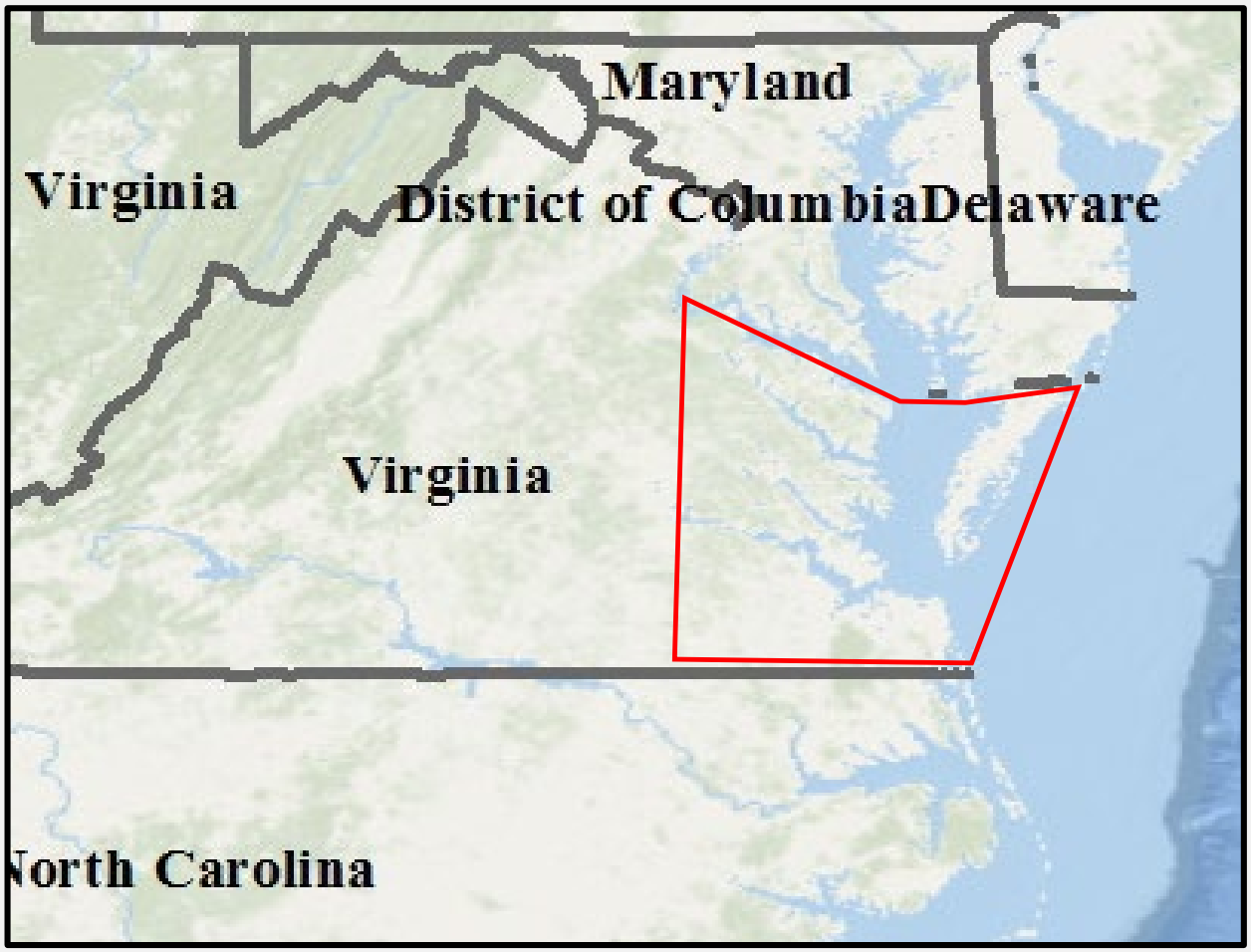
Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Alex Costidis
- Affiliation: Virginia Aquarium
- Please acknowledge additional members from your program who are attending this workshop: Sue Barco

Primary research objectives: Cause of death forensics (focus on human interaction), morphological/biomedical research, life history

What methods do you use: Necropsy, diagnostics, dissection, imaging

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.



Entire coastline of VA, from NC to southern shores of Potomac on mainland, and just north of Chincoteague on the Eastern Shore.

What three things should NMFS know about your work:

I: Significant investment of resources (financial & staff) to maintain high quality forensic examinations

II. We are most interested in if/how our pathology findings contribute to research & conservation efforts, and ways to increase our contributions

III. PhotoID work from early 90s to early 2000s added to MABDC.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I:

II.

III.

What could be done to improve the efficiency of collaboration among research groups?

I: Better communication of regional findings and how each members contributions are used for management.

II.

III.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : Victoria Thayer
- Affiliation: North Carolina Division of Marine Fisheries, NC State University College of Veterinary Medicine
- Please acknowledge additional members from your program who are attending this workshop:

Primary research objectives:

Respond to as many live and dead stranded marine mammals in central coastal and northern and central inland NC, conduct complete necropsies as feasible, and share samples, data, and photos with collaborators. Examine animals for emerging and continuing diseases, identify human and fisheries interactions. Upload NC Marine Mammal Level A and Human Interaction Stranding data to National Database from North Carolina stranded animals. Analyze bottlenose dolphin stomach contents, assist NC Stranding Partners, and continue necropsy training and outreach for citizens, including diverse and underserved groups.

What methods do you use:

Basic necropsy techniques, stomach analysis using basic stomach analysis techniques. (pilot studies in DNA barcoding, microplastics identification), identification of otoliths using otolith guides, experts at NC State and NC DMF. Contribute images to MADBC.

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.

What three things should NMFS know about your work:

I: Strandings in the Albemarle Sound occur from March to November

II. Bottlenose dolphin strandings occur surprisingly far inland, for instance one animal stranded in the Tar River near Greenville.

III. We have photographed some individual dolphins since the late 1980's

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I: How does the distribution of the various stocks change seasonally and annually? How has the 2013-2014 UME affected distribution? How is climate change affecting distribution?

II. How does abundance of the various stocks change seasonally and annually? How has the most recent UME affected abundance? How is climate change affecting abundance?

III. When will the NNNCES and the SNCES estimated be updated? How are stranding data used in stock assessment?

What could be done to improve the efficiency of collaboration among research groups?

I: In NC, the collaboration among the stranding groups is excellent, thanks largely to the excellent leadership of W. McLellan and A. Pabst.

II. The collaboration among the MADBC group is excellent, thanks to the excellent leadership of K. Urian.

III. I believe that NMFS could share information from previous live captures in NC (age data, mortality data), so that researchers are able to update their databases.

Tursiops Research Workshop – Research Summary

- Name of Primary Participant : William McLellan
- Affiliation: UNC Wilmington
- Please acknowledge additional members from your program who are attending this workshop: Vicky Thayer, Ann Pabst, Tiffany Keenan

Primary research objectives:

Investigate marine mammal strandings

What methods do you use:

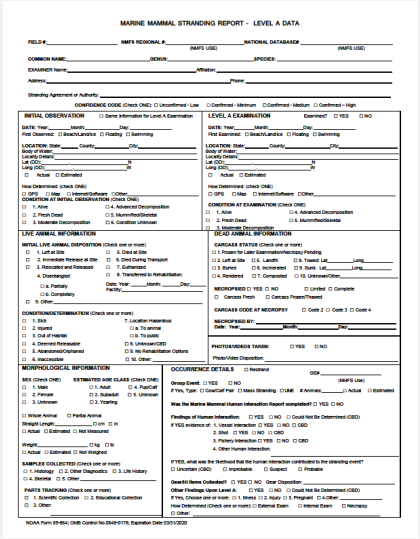
Dorsal fin ID, Human Interaction evaluation, health assessment, genetics, histopathology, virology, bacteriology, microbiome scanning, physiology, morphology, life history in warm H^2O

Please include a map of your survey area/geographic scope of your effort or use this blank map to identify your study area and effort. Please zoom/crop as needed.

The entire coast of NC, the nearshore waters and the interior waters

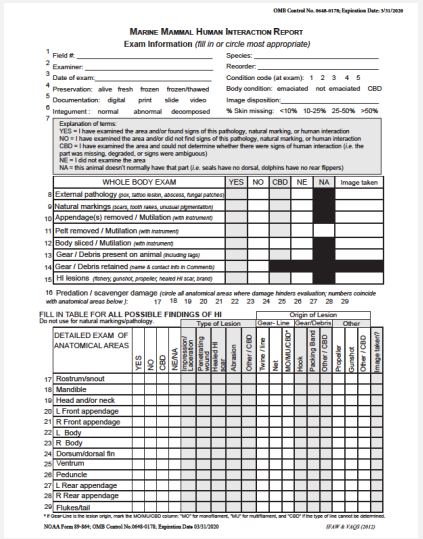
Exam/Necropsy

Level A Forms



MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

HI Form



MARINE MAMMAL HUMAN INTERACTION REPORT

Exam Information *(fill in or circle most appropriate)*

What three things should NMFS know about your work:

I:

The NC stranding network is truly the face of marine mammal conservation- a HI/FI animal on a beach provides an opportunity for the public to see competent response and ask questions of how these issues are being resolved. Let's resolve these growing Tursiops questions!

II.

The NC stranding network pioneered investigating human interactions and has seen nearly all the ways humans affect marine mammals. The current HI protocols have been completed since the late 1990s and there are now multiple trends that have been observed over the decades. The stranding network does provide important both baseline and acute data on nearly every mammal species in the North Atlantic.

III.

The NC stranding network has been operational in the "modern era" since the early 1990s. Investigating strandings in NC does go back to the mid-1800s with the work of various investigators at the Smithsonian Institution. This makes the NC network the oldest collection In the world.

What are the most important outstanding questions regarding distribution, abundance and stock structure?

I:

The extent that coastalTursiops are found offshore is important for upcoming energy development. This is more important as these animals are found further north along the coast by the year and are also found now 100 miles inland.

II.

Multiple Tursiops stocks do not have abundance estimates and therefore no PBR calculation is possible. Takes are basically not addressed!

III.

What are the stock boundaries? Without this information the smallest stocks, and stocks that are most susceptible to decline are not managed effectively.

What could be done to improve the efficiency of collaboration among research groups?

I would suggest there is a regular set of questions that are asked of the entire east-coast marine mammal research community in an annual workshop. These questions could range across multiple/all species and is away for the entire community to contribute their data and resolve long-term issues. This year could be coastal Tursiops and stock assessment (ok 5 years). Next could be spotted dolphins, then pilot whales, then Grampus…. Over the focused year, people could see work being undertaken, data gaps identified, and solutions met.

The stranding program does incorporate ALL identifiable Tursiops mortalities into the MABDC. Long-term matches and life history data are completed across the coast.

Most Tursiops researchers do collaborate very well!

Attachment 3a:
Participant Questions: Tursiops Research Workshop

Please complete one form per research program.

Your name:

_____

Research Program/Affiliation:

_____

Research Scope

1. What are your primary research objectives? (Select all that apply)

Check all that apply.

- [ ] Estimation of abundance
- [ ] Social behavior
- [ ] Population structure
- [ ] Distribution & movements
- [ ] Documenting sources of mortality

Other: [ ] _____

2a. What is the status of your research?

Mark only one oval.

- ◯ Ongoing
- ◯ Completed

2b. When was your research initiated? (MM/YYYY)

_____

2c. If applicable, when did your research end? (MM/YYYY)

_____

Describe the geographic range of your study area (e.g., how far into coastal waters do you survey?):

4. Where is your field effort focused? (Select all that apply).

Check all that apply.

- [ ] Bays/Sounds/Estuaries
- [ ] Coastal waters

5a. What is the northern boundary of your study area? (Lat/Long in dd.mmmm - decimal degrees)

5b. What is the southern boundary of your study area? (Lat/Long in -dd.mmmm - decimal degrees)

6. Is your effort year-round?

Mark only one oval.

- ◯ Yes
- ◯ No, it's seasonal (see question 7).

7. If your effort is seasonal, please describe.

Research Methods

8. What methods do you use? (Select all that apply).

Check all that apply.

- [ ] Photo-ID
- [ ] Line-transect surveys
- [ ] Passive acoustic monitoring
- [ ] Biopsy sampling
- [ ] Behavior observations/focal follows
- [ ] Citizen science
- [ ] Telemetry
- [ ] Stranding response
- [ ] Life history
- [ ] Stable isotope analysis
- [ ] Genetics
- [ ] Surveys of Local Ecological Knowledge (e.g., social science surveys of fishers, others)
- [ ] Baseline population monitoring
- [ ] Opportunistic effort

Other: ☐ _____

9a. If you are conducting photo-ID, how do you conduct your matching? (Select all that apply).

Check all that apply.

- [ ] Manually
- [ ] FinBase-user assigned attributes
- [ ] finFindR
- [ ] Other computer-assisted matching system.
- [ ] A combination of methods

Other: ☐ _____

9b. How many bottlenose dolphins are in your catalog?

_____

9c. How current are you with your photo-ID matching/analysis? (MM/YYYY)

_____

10a. Have you conducted additional photo-ID effort that has not been included in the MABDC to date?

For example, you have initiated a photo-ID project in a new area, and that catalog has not yet been submitted to the MABDC.

Mark only one oval.

- ◯ Yes
- ◯ No

10b. If so, where and when?

_____

_____

_____

_____

_____

11a. As part of your research, do you assign individual dolphins to stocks as defined by NMFS?

Mark only one oval.

- ◯ Yes
- ◯ No (go to question 12)

11b. If yes, what criteria do you use to assign an individual dolphin to a stock (e.g., how many sightings and over how many seasons are used to assign an individual to a stock)?

_____

_____

_____

_____

_____

12. Do you conduct your work under a NMFS permit (Scientific Research Permit or General Authorization)?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Other: _____

Discussion questions

13. What 3 things should NMFS know about your work?

#1

#2

#3

14. What are the most important outstanding questions regarding:

Distribution?

Abundance?

Stock structure?

15. What could be done to improve the efficiency of collaboration among research programs?

16. To facilitate our discussions, we request that you select one primary participant to represent your research program - please identify that individual here.

Name

_____

Title

_____

Affiliation

_____

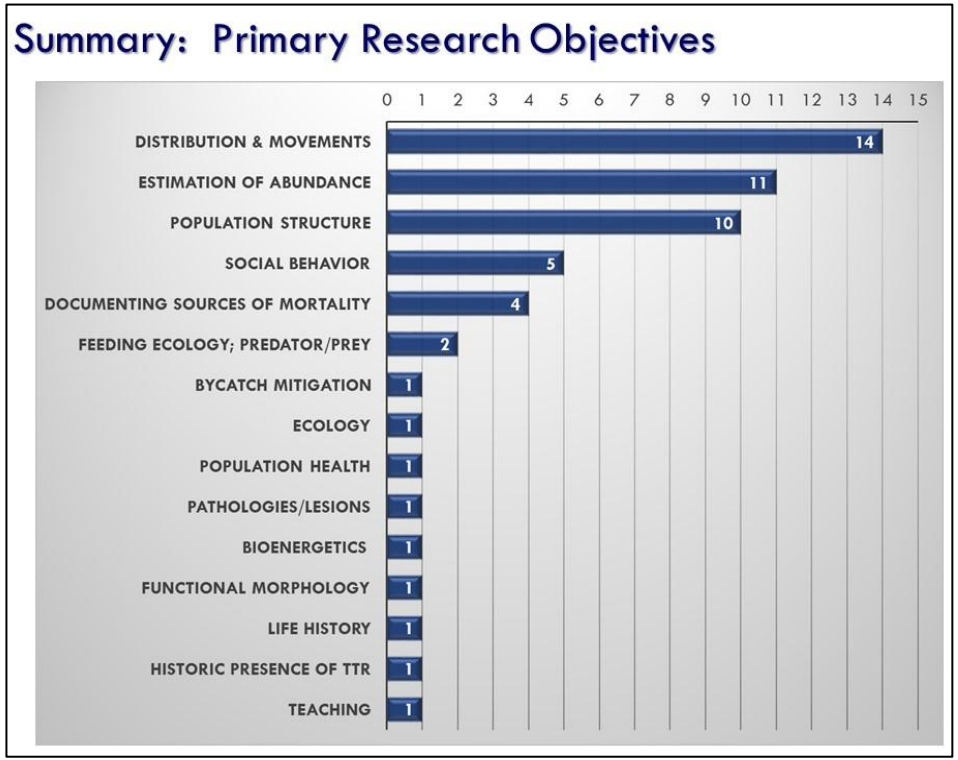
Email address

_____

Phone number

_____

Attachment 4: MABDC Questionnaire Summary. Summary of responses from the pre-workshop questionnaire submitted by workshop participants.



Attachment 5: Breakout Group Summary Table

General Ideas from All Groups

Integration (and financial support) of FinFindR or equivalent for MABDC to facilitate matching - Keep eye on emerging technology
Support MABDC to be maintained, curated, and up-to-date
Expand MABDC to facilitate other data (like NARWC- genetics, telemetry, acoustics, demographic data, etc)
Incorporating genetics and photo ID data - What's the fastest way to do that? There are still catalogs not in MABDC so do we take those catalogs and match them or wait until they get into the MABDC - A list of animals biopsied so that each group could look for them
This group or similar group to meet once or twice a year - Virtual meetings help make this easier - SEAMAMMS as a venue
Other -Share the annual summary reports from people who have General authorizations to do this work -Systematic data collection? -Challenging given different timelines on data sharing across institutions doing research.

Group 1		
#	Priorities	Challenges/considerations
1	Improve understanding of the genetically identifiable DIPS range wide GENETICS	This question applies to all locations. Genetic differentiation along latitudinal boundaries - nearshore coastal vs offshore coastal split? - Shareable database/information on genetic ids including links to Photo-id? - Challenges sampling the hard to sample animals
2	Evaluate relationships between VA/Chesapeake Bay animals and other designated stocks. VA/Chesapeake Bay animals	- Need continued support for photo-id, matching, and integration with MABDC - Biopsy effort is needed - Improve sampling from fisheries takes and strandings
3	Within NC estuaries, better understand habitat, prey resources, etc. to better understand movement and occurrence patterns NC DIPS	- See above on ensuring that we have good understanding of DIPs in this area - How variable are the boundaries (if they exist) between stocks, and how to account for that.

Group 2		
#	Priorities	Challenges/considerations
1	How to define meaningful manageable stocks: ● Integrative/collaborative approach that would include multiple synoptic seasonal surveys, biopsies of known animals, photo ID history, ecological samples, PAM, acoustic telemetry to get at seasonal component	Challenge: ● what is NMFS priority (see priority 2) ● finding the sweet spot for geographic area (not too large to lose fine scale, but not small to miss extent of range) ● which animals to target
2	Identify stocks most concerned about based on size of population, number of takes (bycatch) given stock delineations Target: VA/Chesapeake and NC estuarine	
3	LONG TERM GOAL: Better understanding of why these DIPs partitioned in these environments the way they are (what are the ecological reasons), b/c if understand these can better accommodate climate change and may be able to help us mitigate human impacts	

Group 3		
#	Priorities	Challenges/considerations/Detailed information
1	Expanding genetics work and integrate it with more samples and other types of information (i.e., photo ID) ** Priority ** matching the samples Nikki has to the MABDC, full inventory of animals that have been sampled and if we have good photos for them (both for Nikki's samples and other biopsy samples not currently included). For up to Chesapeake and SNCES range south Taking integrated approach with genetics and photo ID data	● Expanding genetics work with more samples and other types of information ○ Add additional biopsy samples already collected and collect additional holes ■ Southern SEUS - for migratory stocks ■ Northern South Carolina (southern range of SNCES) ■ Do we have all the biopsies from the southern part of the NC? ■ Filling in holes in NC (using Duke's biopsy samples) ■ Up in the Chesapeake bay (using HDR biopsy samples) ■ North of Chesapeake ■ Shelf samples ■ Stranded animals- challenge is with degraded data, it's harder to do. ● FI positive fresh animals is what's needed ● A question for Nikki- if there are samples other than skin to be taking for this type of analysis, let them know. We don't know if there is a particular sample type that is best for this, but Nikki will consider this question. ■ If we don't have many photo ID'd biopsied animals, then that should be something to think about. ○ Integrate MABDC photo ID data into the genetics data (match every biopsied sample to the catalog) ■ Would help with seasonality/distribution/history ■ If you took all the non-May to Oct out of data what does that do to the map? (really only reduces sample size by orange group) ■ Social networks ○ Acoustics ■ Could we add this as a part of the MABDC (for example Helen and Laila seeing if they can match signature whistles)?

2	Determining if there are two stocks in Southern NC (estuarine NC stocks)	● If dark green were SNCES- would expect them to go farther south than that especially in the summer? ● If light green is a second stock in southern NC then there is lots of overlap (maybe that's two DIPs to be managed as one stock because of overlap). Tough for management. ● Best way to resolve if there is really light green and dark green- more animals from the season we know the stock should be there. Any other line of evidence to explain why there are two overlapping but not interbreeding populations there. Environmental variable? Acoustics (do they sound different)? Do they live their lives separate and this is just a small time of year they overlap? ● Are they the southern end of one stock and the northern bit of another (part of the picture due to somewhat limited sampling)? ● Lots of impacts in this area (coast line is changing, storms, UME, etc). Genetics are supposed to account for many generations but these animals have had to undergo a lot of changes in their habitat in the recent past. Are these two pieces becoming more different or more similar? Habitat there (or lack thereof) might be why they are overlapping. ● In order to resolve we need to know what is going on in SC, or Myrtle Beach ● Shrimp trawl animals and IWC animals (exhibit differences and although shrimp trawl animals are along coast, they seem to follow boats in. ● Social network data of some of those light green/dark green animals - do light green associate with dark green? Relatedness information.
3	Does SM exist or is it one big migratory stock? Integrated approach (biopsies, tagging, photos)	● Extending sampling and tagging further south ● Tagging- some tags put out in GA have helped elucidate stocks there. Is that a tool that could be helpful here? Could this help address the "SM" stock question and differentiations between migratory stocks. Spot tags, remote sampling, other methods? They are difficult to even photograph so tagging would be difficult. ● Is SM an onshore/offshore stock? ● VA observations include huge groups, not boat friendly, only seen once ("mystery pulse"). ● In NC, huge pulse of animals associated with spot run in Oct/Nov ● Facing potential threats from wind development because pile driving will likely be in the summer (quiet in the winter because of migratory whales)